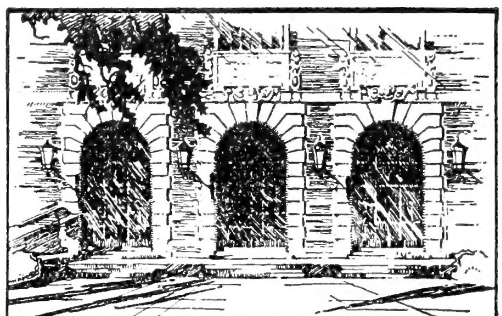

HARDWICKE'S

SCIENCE-GOSSIP:

1878.

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HARDWICKE'S

Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY

J. E. TAYLOR, PH.D., F.L.S., F.G.S., F.R.G.S.I., &c.

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PREFACE.

TO write a Preface year after year for a volume like SCIENCE-GOSSIP, to mean the same thing, and yet to say something new, would be a tax upon the ingenuity of the most skilful writer. Nevertheless, the Editor feels it both a duty and a pleasure to take such an opportunity of expressing his gratitude towards so many cheerful helpers, his sympathies with diligent students and inquirers with whom he has been in silent monthly communication, and his hopeful anticipations that the time to come may find him surrounded by as many friends as at the close of the eventful year 1878.

The last four years have been fruitful beyond measure in Scientific discoveries. In Physical Science, the numerous revelations have been almost startling in their novelty, and these have culminated in that simple and yet wonderful instrument, the Microphone. To listen to the tramping of insects is like hearing the "footfalls on the boundary of another world." Is it possible that the Microphone will be to organic sound what the Microscope has been to vision? Shall we listen to the love-narratives of insects as we do unaided to those of birds, or be possible hearers of their domestic squabbles?

Unhappily, it would seem as if Science, like some land of Goshen, were the only arena where Peace may find a perpetual home! For, although scientific men, as inheritors of a long ancestry of the spirit of partisanship, cannot avoid taking sides in debating the great questions which are continually raised in their unfettered investigations of natural phenomena; they do not condemn each

other to pains and penalties for daring to disagree. No sword is here wielded, nor artillery thundered, to determine by force what calm reason finds herself unable to settle. Rather, a greater incentive to further inquiry is produced, to redoubled observation and verification of facts, and to renewed diligence in the search after truth, if haply they may find it! Will the time ever come when Politicians will condescend to follow the example of *savans?*

It is cheering to observe the wider love of Nature and the spread of scientific culture among all classes; to note how the pursuit of Science is a bright spot in the lives of toilers at the desk, the loom, the anvil, and in the field. Our position fortunately makes us acquainted with diligent and capable students, low in the scale of worldly wealth and position, whose lives are sweetened by the new interest in common things which popular Science has created for them. Long may it continue to be so, and may the day soon come when men and women will be rescued from their lower natures by the calm dignity which Wisdom bestows on those who seek her!

As hitherto, our purpose is to keep pace with modern discovery and investigation, and to throw open our columns to the recording of new facts. Not less desirous are we of helping the young inquirer, and of putting him in a way to gain higher and sounder knowledge. Whilst endeavouring to keep clear of mere gossip, we do not wish to write above the heads of our large circle of readers by essays on abstruse subjects. Our aim is to spread and popularize Science, and to encourage a love of it.

In conclusion, we heartily thank all who have helped us, and who have promised to continue their aid. At the same time, we implore the sympathies of those who are unaware of the burden of correspondence and work entailed in editing a journal like SCIENCE-GOSSIP, and who may feel aggrieved at imagined slights. To each and all of those with whom we have been in cheerful literary and scientific companionship for the last year, we wish a "Merry Christmas and a Happy New Year!"

LIST OF ILLUSTRATIONS.

THE POTATO BEETLE.

A LITTLE OIL ON THE WATERS.

By W. V. ANDREWS.

Corresponding Secretary of Long Island Entomologists' Society, U.S.A.

THE occasion of the appearance of this little article is a paper which appeared in the September number of SCIENCE-GOSSIP, written by Mr. E. C. Rye.

No one will dispute the assertion that anything from the pen of that gentleman, particularly on entomology, is worthy of our serious attention, and therefore it is that I regret to see him in the ranks of the alarmists,—already, as I should judge, too well recruited.

I will assure your readers that to us, who have now for some years been familiar with *D. decemlineata*, the alarm seriously felt in the Old World lest this insect should visit your shores seems verging on the ridiculous. I do not, of course, mean that reasonable precautions should not be taken; but the idea of stopping the transmission of dead specimens through the mails, as I know has been done, and thus preventing your people from making a personal acquaintance with the insect, appears to me to have a tendency to defeat the object in view.

Certainly I should advise no Englishman to import live specimens, and I should advise all farmers and gardeners to rid themselves of the presence of the beetle, as I should advise them to rid themselves of a crop of thistles. But if they imagine that its existence in their fields is likely *seriously* to injure their crops, then I assure them that they are very much mistaken. We have had this beetle on Long Island in immense numbers for some years, and I do not believe that any one has suffered any appreciable loss through its depredations. Farmers all say this.

If any loss have been sustained, it has rather been through the remedy used than through the disease. And here let me earnestly advise my countrymen—for I am an Englishman—if the beetle should make its appearance in the tight little island, to *use no Paris green*, or other poisons, with a view to its extermination. There are two or three sufficient reasons why such remedies should not be used:—

1. Its application, in any form, is not without danger. If it be dangerous to wear green silks or to use green paper for walls, it surely must be injurious to apply this poison in any way by which its entrance into the human system is rendered possible, and probable.

2. The first shower of rain or gale of wind will remove every particle of the powder from the foliage of the potato, and either disseminate it through the atmosphere or imbed it in the soil, to be stirred up by the hoers or diggers.

3. Its use is entirely unnecessary. For small plots of land hand-picking by boys or girls is efficacious and without danger (for I do hope that your readers are not believers in the foolish stories told of the beetle being poisonous). For larger lots an ordinary butterfly bag-net, swept gently along the potato-tops, will capture more beetles in an hour than Paris green will kill in a week; and, by the way, recollect that Paris green will kill other things besides potato beetles. An American farmer applied a pretty good dose of this poison to the potatoes in his garden "one dewy eve," and on the next morning found four dead milch-cows in his pasture. The cows had broken into the garden, and—increased the quantity of beef in that vicinity.

Mr. Rye tells you that Paris green is a favourite remedy here, but he does not understand the American mode of doing things. Some State entomologist or other probably had a friend in the oil and colour

business, and gave a friendly puff to Paris green. Then the oil-and-colourman advertises in some agricultural papers that he has the "never-failing exterminator" of potato-bugs—Paris green, and the editor of that journal at once *strongly* recommends it. You do not do things in that way in honest old England, but we do here.

One word of advice. When your potatoes are four or five inches high, just occasionally turn up the leaves and examine the under side. If you find a bunch of orange-coloured eggs, nip them off. They probably were deposited by *D. decemlineata*. In a week or so look again. If you find that the foliage has been eaten from a plant pretty thoroughly, and should find a dirty brick-red animal, like that figured by Mr. Rye, on that plant, remove the animal the way I have advised. It is the beetle in its larval state; and, recollect, that in that state it does most of its eating. But it is a poor traveller, and does not wander about unnecessarily. So, when you have found one from a batch of eggs, you may be sure the others are near at hand. One stroke from the net will capture most of them. Work attentively, now and again, and your potato crop will not suffer. Recollect, however, that other things besides *D. decemlineata* eat potato vines. Here we frequently suffer from the attacks of the *Lyttas*, or blister-beetles, which devour lots of potato foliage.

Caution! Mind, that all striped beetles found on potatoes are not Colorado potato beetles, but may be useful little fellows, whose larvæ devour other larvæ injurious to us.

THE PRONUNCIATION OF SCIENTIFIC NAMES.

IN regard to the pronunciation of Latin and Greek, perhaps the confusion of theory and practice is greater at the present time than it has ever been. The attempt to give *c* and *g* the hard (guttural) sounds in all such words is really only a part of a much wider scheme, which aims at restoring, as far as possible, the actual pronunciation of the ancients themselves. If these actual sounds can be recovered with any certainty, there is a possibility that some time Latin and Greek will be pronounced in a similar way by all who learn them, to whatever nation they belong. This is only what is done, as a matter of course, in the case of all other tongues, and no reason could be assigned for adopting a different practice in this instance. Prejudice stands in the way, but we need not despair of overcoming it. When I began to learn Latin, I was told that when I travelled in a foreign country, the language of which was unknown to me, I should be able to communicate my wants to any well-educated man by expressing them in Latin. In writing, of course, this could always be done, as, in fact, it is in the correspondence of many scientific men of the present day, especially those who belong to the Russian, Swedish, and other nations, whose languages are not generally known. But if two of these *savans* met, they would be as entirely unable to communicate orally with one another as if they knew no Latin at all—a result which I have no hesitation in calling ridiculous.

But is there any possibility of recovering the actual sounds used by the Greeks and Romans at the time of their greatest literary prosperity?—the last clause being necessary, because their pronunciation changed with time, as ours has done. This is not the place to discuss the question, but the attempt has been made, and, I believe, with success; not with absolute certainty, perhaps, but sufficient to remove, at any rate, most of the difficulties in the way of the adoption of a universal standard. It is no objection to this proposal to say that the people of each nation are incapable of pronouncing certain sounds. This is not true, so far as relates to the languages with which we have practically to do. No Englishman, for instance, if *properly* instructed, can fail to learn the sound of the German *ch*, or the French *u* or *eu* in a short time, and practice will then make it easy. Moreover, the number of *sounds* peculiar to each nation is much exaggerated. The French, it is said, have a dislike to the sound of *w*. It would not be difficult, were this the place for doing so, to make out a long list of words which every Frenchman uses, in which this *sound* occurs, though not the *letter*. Conversely, the so-called peculiar vowel-sound of the word *cueillir* has its exact counterpart in English words.

Although the time is not ripe for the adoption of the above-mentioned scheme in its entirety, there is one feature of it which will form a good step in advance, and which may be at once accepted. This is the absolutely certain fact that *c* and *g* should invariably have a guttural sound. I am not speaking of the attempt to make this rule apply to English words derived from classical roots. *That is quite a distinct subject*, though it is not always kept distinct. Scientific names are Latin words, and should be so pronounced. The case of *Geranium* and the like will be no obstacle, for it is easy to pronounce the *g* hard when we speak of *Geranium molle* to a fellow-botanist, and soft when we speak to a lady-friend of the geraniums in her conservatory. This is no more than is done every day by people who can speak more than one language. They do not, for instance, give the same sound to *ball* in English, and *ball* in German, because they are spelled the same, and are names of the same object: and similarly with the French and English *point*.

With reference to the pronunciation of words derived from names of persons and places, it will be only consistent to insist that they shall be sounded according to the rules of the language from which they are taken. In so far as they are neither classical words nor derived directly from classical sources,

there can be no reason for pronouncing them as such, even if it were not sometimes impossible to do so. I feel sure every botanist, meeting with one of these strange-looking words, would rather give it the proper sound than attempt to pronounce it according to English rules, with a result which, he is painfully conscious, is absurd. What is wanted, is a compendious and handy guide to the sound of the letters in the chief foreign tongues, such as French, German, Italian, Swedish, etc., and even Russian. It will be found that the sounds which do not exist in English are very few, and plain directions can be given for the attainment of most of those. Were such information commonly disseminated among scientific men (and perhaps SCIENCE-GOSSIP would be a good place for it to appear in), we should cease to hear such barbarisms as *Hypnum Swartzii*, with the *w* pronounced as in English, and *Veronica Buxbaumii*, with the *au* as in the English *haul*. It would be found, too, that the trouble required would not be great. Merely to learn how certain consonants and vowels are sounded in a language, is a very different thing from learning the language itself.

W. B. GROVE, B.A.

A DOMINIE'S BOTANICAL HOLIDAY.

WHAT a grand thing it is to have a holiday, and how refreshing to live almost out of doors for a whole month; to wander hither and thither fancy free, by the brookside, or amid the tangled mazes of the wood, to ascend to the top of yonder hill, or to find out a path for ourselves through the glen—to climb the rock by the sea-side, or to lie on one's back on the thyme-covered bank above! With some such thoughts did I awake one morning in the summer-time of last year. My holiday I intended this year to spend in the west of Scotland, and once on board the *Marmion*, with the "guid braid" Scotch tongue all around me, I fancied myself there at once. The weather was beautiful, and the good ship *Marmion* steamed away right merrily for the North. As we reached Flamborough Head we had a good view of the land, and all the way from this point the objects of interest were noted by tourist passengers.

All this time I am on the sea, and as I cannot do much in a botanical way on board of a steamer, I live in a sort of poetical dream, in which the characters in "Marmion" are all chasing each other through my brain. At length we arrive at our destination, and saying good-bye to the steamer, I pay a short visit to "Auld Reekie," my Alma Mater, and in a short time find myself *en route* for the west.

On arriving at A———, my botanical rambles at length begin, and I am soon in the full enjoyment of the pleasures I had looked forward to. Over most of the ground I had already made excursions as a boy. Then my pursuit savoured somewhat of ornithology, now in manhood's day I was a humble student of the beauties of Flora's domain.

Several of my rambles on this occasion I shall always remember with pleasure, and one of those in the foremost rank would be that visit to the Carrick country. Who does not admire the purple heather of our Scottish hills? Now I was able to make a distinction between the commonest kind of all—Ling or *Calluna vulgaris*, and the different kinds o Erica which grow together on the hill-side, and a new pleasure seemed to be mixed with my boyish love for the "dark purple heather." The Blue-bell (*Campanula rotundifolia*) is to be found gracefully nodding its head to every little breeze, and seeming to bring up memories of "auld lang syne," and, although I can remember it as one of the most delightfully common of little flowers of my boyhood, I can also remember the words of Ellen, the "Lady of the Lake," that—

> "It drinks heaven's dew as blithe as rose
> That in the king's own garden grows."

A wealth of hillside flowers is to be found around me, such as the pretty little Eyebright and the Creeping Cinquefoil, with its relative the common Tormentil. Moving on a little on one side I come across two of Our Lady's flowers—the Lady's Mantle (*Alchemilla vulgaris*), and the *Galium verum*, or Lady's Bedstraw, or Beadstraw. Getting into a part where the ground is somewhat moist and boggy, the lovely *Parnassia palustris* soon rivets attention. What a splendid view from the top of the hill! Right away to the Irish coast almost, on one side, and around me I can survey the whole extent of country where

> "Bruce he shook his Carrick spear."

Another very enjoyable ramble was the one paid to Loch Doon, the birth-place of the "bonnie Doon." This was accomplished by going by rail to Dalmellington and walking to the loch. The walk by the side of the Doon is a magnificent one, and as the glen gets narrower and the rocks higher I am fairly enraptured with nature's works. At length I emerge from the glen with pleasant thoughts of the beauty of the ferns and mosses which I have seen peeping out from the crevices of the rocks and adorning every spot of vantage. Keeping company with the Cryptogamia I had also observed quantities of that pretty saxifrage the London Pride, or "None-so-pretty," and the Crow Garlic, with its beautiful star-like blossoms, and its leaves somewhat resembling those of the Lily of the Valley. Having got safely through the glen, I find myself on the borders of a wild highland lake, studded here and there with islets. Being desirous to change the walk, I reach Dalmellington by a different route, and as I have to pass through many acres of bog-land, my old friend the *Parnassia*

palustris is found in great plenty. The Ericas also look well, and I am constrained to gather some of them. I also find the Milkwort, or Rogation flower, in great plenty and very various in its hues. Dalmellington is at length reached after a long ramble, and I am glad of a little rest after my labours.

The flowers on the Ayrshire coast are very numerous, and an excursion for the purpose may be made with advantage by any one who may be interested in wild flowers. The Sea Convolvulus and the Rest Harrow, with the Scurvy Grass and the *Eryngo Maritimum*, may be found here in great plenty, besides hundreds of other well-known plants. A great many varieties of the most beautiful of the Algæ may be gathered on the sea-shore after a storm.

Fig. 1. Grass of Parnassus (*Parnassia palustris*).

After spending about a fortnight on the mainland I determine to make the Isle of Arran, in the Firth of Clyde, the scene of my operations for the remaining part of the time. Crossing one morning from Ardrossan in a little steamer, I arrive at Brodick, and at once start for a walk across the island. Having got right to the other side I proceed to arrange about a lodging, and as I am out of the way of all bustle I make up my mind to enjoy myself. I could soon see that I was looked at, as I thought, with some degree of patronage by the natives. In order to encourage me several hoary islanders used to appear with immense bundles of weeds round the cottage where I lodged, about eventide. As the evenings were fine I used to take a chair out of doors and hold a sort of reception. It was to me very amusing to observe the specious pretexts by which these "ancient mariners" used to lure one to talk when they found that I could tell them about London; and how desirous they were to know all about it. Almost every evening I might

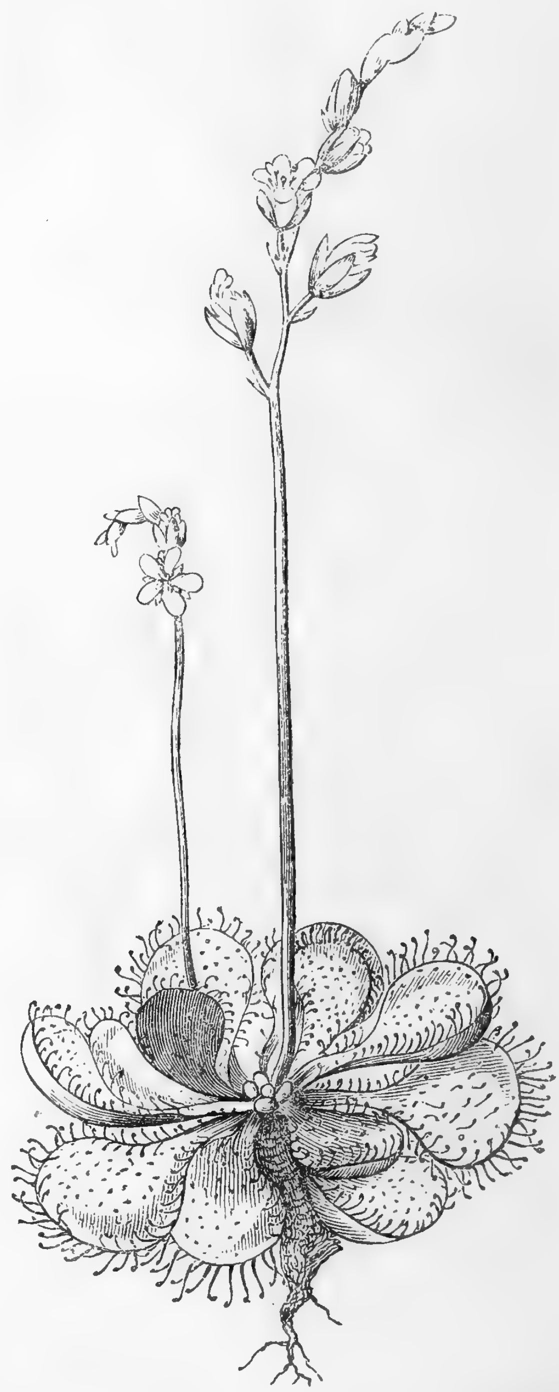

Fig. 2. Round-leaved Sundew (*Drosera rotundifolia*).

expect one or more of my friends coming to visit me, and to hear something more about the "big ceety." In the daytime I enjoyed my rambles exceedingly, and I came across many specimens here that I had not seen for some time. The lovely Alpine Lady's Mantle repaid a climb up one of the hills, and in the boglands below I found the *Drosera rotundifolia*, and its usual companion the *longifolia*. Another carnivorous little plant which is often a near neighbour, one of the Butterworts,

Fig. 3. Purple Loosestrife (*Lythrum Salicaria*).

I also found in the same neighbourhood. One part of the bog I found quite covered with the Cotton Grass, and close by a great deal of the Marsh Cinquefoil, which, although it has done flowering, I am able to make out by its strawberry-looking seeds. Another part of the bog I find covered for a great distance by the Horsetail (*Equisetum*), and in the running stream by the side, its representative the *Hippurus*. The Bog Bean is also present with its tripartite leaf, but it is now destitute of flowers, and in close proximity is the Marsh Valerian. Before leaving the moist ground I feel called upon to admire the beauty of a large patch of the Purple Loosestrife, which has a grand effect.

It was after one of my excursions, and whilst I was holding my usual evening "confab" with my friends, that one of them confided to me that "a wee drap o' Luckie Findlay's whusky wad be a guid thing to carry wi' ane oot on tha hills." I told him that it might or it might not, but as I did not want it for the purpose of quenching thirst it would be a useless encumbrance. I saw that Donald looked quite astonished at my temerity to venture to speak slightingly of what was to him, no doubt, a sovereign remedy for everything whatever.

It was only a day or two after this that I took my farewell ramble in Arran. It was not the best of days, and the weather seemed to be breaking up. As my holidays were now drawing to a close, I was not so much concerned on the subject. In this, my last excursion, I came upon the *Osmunda regalis* in a boggy piece of ground. It was growing up in several clumps, and looked very well indeed. After this I also came across the Sweet Gale, or Bog Myrtle. It was about here in great profusion, and smelt very strongly of the myrtle-scent belonging to it. A little farther on amongst the Sheep's-bit Scations and the heather, both purple and white, I found for the first time the pretty Bog, or Lancashire, Asphodel. Another plant which I found for the first time was the pretty White Sedum, down on the rocks by the beach. Though I have often gathered these two plants since, this was my first introduction to them, and I shall always remember them in connection with the "Misty Isle of Arran."

J. MILLS HIGGINS.

TAME BEARS IN SWEDEN.

By JOHN WAGER.

IT is well known that the Bear, by a course ot severe discipline, can be taught to carry a long pole in his paws or a pert monkey upon his back, to dance to the music of pipe and drum, and to perform tricks which the solemn gravity of his demeanour, his clumsy motions, and shaggy hide, render the more amusingly grotesque. He may also be seen, in the den of a menagerie, to leap through a comparatively small ring encircled with flame, associated, during the performance only, with leopards and a hyæna; though the uncouthness and reluctance with which he accomplishes the feat, contrasted with the graceful and ready spring of the leopards, is enough to make the hyæna laugh; while, of all the performers, he has evidently the most intractable temper, and is least trusted by the spangled damsel who presides with the whip.

Yet, when young, the Bear is not altogether devoid of amiable qualities, as the following narrative will prove. The account was communicated to the present writer in 1867 by a Swedish acquaintance residing at Mora, in Dalecarlia, the bear being then living, and the property of a gentleman at Siknäs, in Venjan, an adjoining parish, having been taken when about three weeks old from the adjacent forest in February, 1865. Being fed with warm milk, young Bruin throve satisfactorily, and when large enough to enjoy liberty he usually sojourned in the yard with the bear-dog "Jeppe," playing and springing about his companion like a cat. He was also much attached to his master, delighting to accompany him not only to the forest, where he often clambered up trees, but also into the house, where removing chairs and tables from one room into another appeared to be his favourite occupation. Strangers who visited Siknäs always received his attentions; but as these were somewhat brusque, and expressed in a surly tone, they tended rather to repel than attract.

To Swedish punch (a luscious compound of arrack and sugar) he was extremely partial, and partook of it, whenever invited, out of a glass, like a well-bred gentleman, but afterwards showing his loutish and lumpish nature in a drunken fit, concluding with heavy sleep and loud snores.

One day, while Bruin was yet of tender years, a kitten came into the yard and immediately drew his surprised attention upon herself; but young Puss, not admiring his looks, first cast upon him an angry glance, and then sprang up and fixed her claws in his head, exciting such alarm that he trotted off in a nervous perspiration, and ensconced himself in an outhouse. Subsequently he always fled at the sight of this cat, though she was the only one of which he showed fear.

Bruin took a daily bath in the river, which flows within a stone-throw of the house; swimming across and back again. He then trotted to an ice-cellar, the roof of which was easily accessible and covered with deal boards, one of which projected considerably beyond the rest; towards the end of this he used to creep warily, to enjoy the swinging motion that resulted. It was a mode of recreation of which he frequently availed himself.

Whenever he could intrude into the kitchen he bemeaned himself like an officious and meddlesome husband, disordering affairs, greatly to the vexation of the domestics, to whose castigations with a stout knob stick he payed little regard. One day he laid hold of a coffee-pan that stood on the hearth, and was conveying it in his paws to the yard, when the hot contents, overflowing on his bosom, provoked him to cast it on the ground and flatten it with a stroke of his paw. He would also, when opportunity occurred, smuggle himself into the larder (a detached building), looking round first to see that he was not observed, then bring out some article, especially a cheese, which he found convenient to carry; but on one occasion he made free with a tub of *clouted* milk and cream, handling it, however, so awkwardly that the ropy tenacious contents streamed down the front of his erected corpus, and, as in the case of the coffee-pan, brought vengeance on the tub. After fruitless endeavours, with tongue and claws, to clear the viscous mass from his best fur coat, he betook himself to the river, and then solaced himself with a swing.

This partiality for swinging or rocking rendered him an undesirable companion in a boat; yet he constantly followed his owner to the river-side, and if not admitted as a passenger, would swim after the boat, grunting like a hog. During one river excursion which he had been allowed to share he enjoyed as usual his rocking, till the boat, gliding down the river, entered a stormy rapid, when he became quite agitated with fear, trembling in every limb and holding on each side of the boat so long as it remained in the weltering force. When indulged with a ride by land, he would sometimes leap on the shafts of the vehicle, and placing a hind leg on each, rest his fore paws on the horse's back.

As he grew older it was found necessary to impose some check upon his movements, and for this purpose a chain, with a log at the end of it, was attached to a collar round his neck. Such badge of servitude and interference with the liberty of a free-born bear was not to be borne. At first he tried to strike off the log with his paws; then he dragged it to the river, but was vastly irritated to find that after every attempt to sink it, the audacious log came to the surface again. Finally he dug a hole, put the log into it, and replaced the earth, stamping or pressing it down; then apparently satisfied with his work he attempted to move off, but found himself in a worse fix than before; however, after sundry curvets and angry jerks the chain broke and he regained his freedom, leaving his encumbrance in the grave.

In concluding his ursine anecdotes my Swedish friend remarked: "These are but a few of Bruin's traits and droll tricks, which must be seen to be fully enjoyed. At present he lies quietly in his winter lair, but imagine his humour when he leaves it in spring; he is then no agreeable companion, especially for the kitchen-maids, towards whom, and the fair sex in general, he shows the greatest disregard."

Poor Bruin! he must indeed have got up on the wrong side of the bed, for he became so unbearably troublesome and subject to such angry moods, that, as I afterwards learned, at the early age of about three years he was doomed to death, and executed accordingly.

Another young bear, captured in the winter of 1869, was kept for about two years at Ekshärad, in Wermland; but as it grew older it became dangerously ferocious, and, consequently, was also shot. A tame bear, kept at Snö-an, had accidentally one Saturday evening got locked up in the smithy, and not liking to remain in a workshop on a Sunday,

attempted to escape through an opening in the roof. But to reach this Bruin had to clamber upon a lever, which, under the pressure of his weight, opened the sluice-gate, and, turning the water upon the wheel, set the great hammer to work. Evidently annoyed by its persistent motion and noise, he appears to have grasped the hammer in his paws with intent to stop it; but the contest proved beyond his strength, for the neighbours, hearing loud roars, hastened to the smithy and found him lying upon the anvil, having received a death-blow before their arrival.

THE SEALS AND WHALES OF THE BRITISH SEAS.

PART VI.

By THOMAS SOUTHWELL, F.Z.S., &c.

WE now come to the second sub-order into which the Cetacea are divided, namely, the *Odontoceti*, or Toothed Whales. In this section, baleen is never present, but well-developed teeth are found in one or both jaws of the adult; in some species they are very numerous; sometimes, though rarely, deciduous. The blow-hole is single, and the skull generally asymmetrical, or not precisely alike on both sides of the medial line. Professor Flower divides the *Odontoceti* into three families, one of which, the *Platanistidæ*, as already said, is found only in India and South America; the other two, *Physeteridæ* and *Delphinidæ*, are represented in our Fauna by about fifteen species.

Of the *Physeteridæ*, four genera are represented in the British Fauna by five species; namely, one *Physeter*, the Sperm Whale; two *Hyperoodons*, the common Beaked Whale, and a very rare species called the Broad-fronted Beaked Whale; one *Ziphius*, Cuvier's Whale; and one *Mesoplodon*, Sowerby's Whale.

By far the most interesting species is the SPERM WHALE, *Physeter macrocephalus* (Linnæus), which rivals the Right-whale in commercial importance and in the value of its products. This species has a very wide geographical range, having been found in almost every sea between lat. 60° north and 60° south. The attempt has been made, I think unsuccessfully, to show that the Sperm Whale of the southern hemisphere is distinct from that of the northern; there seems, however, no reason to doubt at present, although, of course, it may eventually be found otherwise, that the same species of Sperm Whale ranges over the whole of this vast tract of ocean. North of about 40° it appears to be only a straggler, and although the Arctic seas are almost always stated by authors to be its head-quarters, no well-authenticated instance of its occurrence farther north than Scotland is on record, and Lilljeborg excludes it from his account of the Scandinavian cetacea. Of its occurrence on the British coast there are numerous instances; in all cases, however, they are believed by Andrew Murray to have been stragglers, "which have rounded Cape Horn (they have never been known to double the Cape of Good Hope) or unpromising colonies, for they are becoming scarcer and scarcer in more than their due proportion."* Of the numerous occurrences on the coast of the British isles I shall confine myself to a few early records.

In the church of St. Nicholas, at Great Yarmouth, is the basal portion of a skull of this animal, which has been converted into a chair: it formerly stood outside the church, and of course, as it was an object of wonder, it was relegated to the powers of darkness, and *christened* (?) the "Devil's Seat"; it has, however, now been admitted into mother church, and stands beside the north-west door under the clock. Mr. C. J. Palmer tells me that in the churchwardens' accounts for 1606 there is a charge of 8s. for painting this chair, which clearly proves its antiquity. Sir Hamon L'Estrange, in a letter to Sir Thomas Browne (Wilkins's edit., 1852, editor's preface to "Pseudodoxia," vol. i. p. lxxxi.), says that in June, 1626, a whale, afterwards referred to by Sir T. Browne as a sperm whale (vol. iii. p. 324), was cast upon his shore or sea-liberty, "sometyme parcel of the possessions of the Abbey of Ramsey, &c." The same author, in his account of the "Fishes found in Norfolk and on the Coast," says, "A Spermaceti whale of 62 feet long [came on shore] near Wells, another of the same kind twenty years before at Hunstanton [the one referred to by Sir H. L'Estrange]; and not far off, eight or nine came ashore, and two had young ones after they were forsaken by the water." The whale mentioned by Sir H. L'Estrange came on shore in 1626: twenty years after would give 1646 as the date of the Wells specimen; and in December of that year, according to Booth's "History of Norfolk," published in 1781 (vol. ix. p. 33), "A great whale was cast on the shore here [at Holme-next-the-Sea], the wind blowing strongly at the north-west, 57 feet long, the breadth of the nose-end eight feet, from nose-end to the eye $15\frac{1}{2}$ feet; the eyes about the same bigness as those of an ox, the lower chap closed and shut about four feet short of the upper; this lower chap narrow towards the end, and therein were 46 teeth like the tusks of an elephant; the upper one had no teeth, but sockets of bones to receive the teeth: two small fins only, one on each side, and a short small fin on the back; it was a male . . . . ; the breadth of the tail, from one outward tip to the other, was $13\frac{1}{2}$ feet. The profit made of it was £217. 6s. 7d., and the charge in cutting it up and managing it came to £100 or more." It seems probable that a "school" got bewildered in the shallow waters of the Wash, and that the individual of which Booth

* "Geographical Distribution of Mammalia." By Andrew Murray, 1866, p. 211.

gives such an excellent description, formed one of the same party as the eight or nine mentioned by Sir T. Browne. In May, 1652, Mr. Arthur Bacon writes to Sir T. Browne about the sperm whale cast on shore at Yarmouth, but the actual date of the occurrence is not given. This is the last record of this species being found on the Norfolk coast, with which I am acquainted: it has, however, occurred many times since, singly or in small parties, on other parts of the coast; the last instance, I believe, being in July, 1871, when one was stranded on the shore of the Isle of Skye. Of the osteology of the Sperm Whale, Professor Flower has given an exhaustive account in a paper published in the "Transactions of the Zoological Society," vol. vi., and of its habits a very interesting account is given by Thomas Beals, who, in the capacity of surgeon on board ships employed in the South Sea fishery, had unusual opportunities of observing this remarkable animal. He published a book entitled "The Natural History of the Sperm Whale," to which I am largely indebted for what I shall have to say about this species.

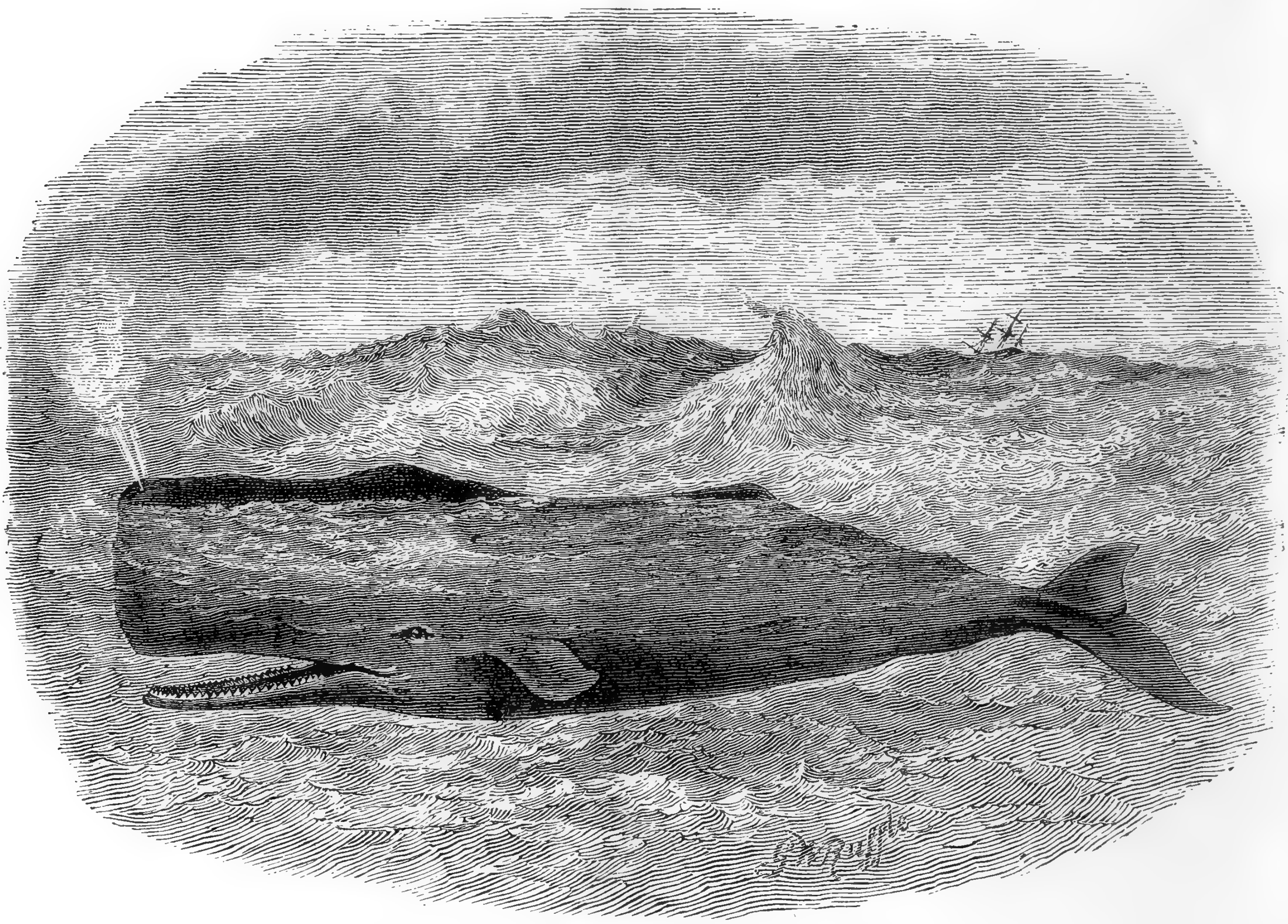

Fig. 4. Sperm Whale (*Physeter macrocephalus*, Linn.).

The colour of the Sperm Whale is black above and grey beneath, the colours gradually shading into each other. The full-grown male is about sixty feet long; the females are much smaller and more slender than the males. The head, which constitutes more than one-third of the whole of the animal, presents a very remarkable appearance, the truncated form of the snout looking as though it were cut off at right-angles to the body: at the upper angle is situated the single blow-hole. The juncture of the head with the body is the thickest portion, and the body decreases little in size till the "hump," which is situated in the place of the dorsal fin, is reached; from this point it rapidly diminishes to the tail. The flukes of the tail are from twelve to fourteen feet in breadth, and the two flippers each about six feet long. The under jaw is pointed, and about two feet shorter than the upper; it is furnished with about twenty-five large conical teeth on each side; but the number is not constant, nor is it always the same on each side. In the upper jaw are no visible teeth, but those of the lower jaw shut into corresponding depressions in the upper. The tongue is small, and, like the lining of the mouth, of a white colour. The upper part of the head, called the "case," contains the "spermaceti," which upon the death of the animal granulates into a yellowish substance. Beals says that a large whale not unfrequently contains a ton of spermaceti. Beneath the "case" is situated the "junk," which consists of a dense cellular mass, containing oil and spermaceti. The blubber is about fourteen inches thick on the breast, and in most other parts of the body from eight to eleven inches. By the whalers this covering is called the "blanket." With regard

to the apparently ungainly head of the Sperm Whale, Beals remarks as follows :—" One of the peculiarities of the Sperm Whale, which strikes at first sight every beholder, is the apparently disproportionate and unwieldy bulk of the head ; but this peculiarity, instead of being, as might be supposed, an impediment to the freedom of the animal's motion in its native element, is, in fact, on the contrary, in some respects, very conducive to its lightness and agility, if such a term can with propriety be applied to such an enormous creature ; for a great part of the bulk of the head is made up of a thin membranous case, containing, during life, a thin oil, of much less specific gravity than water, below which is again the junk, which, although heavier than the spermaceti, is still lighter than the element in which the whale moves ; consequently the head, taken as a whole, is lighter specifically than any other part of the body, and will always have a tendency to rise at least so far above the surface as to elevate the nostril or 'blow-hole' sufficiently for all purposes of respiration ; and more than this, a very slight effort on the part of the fish would only be necessary to raise the whole of the anterior flat surface of the nose out of the water. In case the animal should wish to increase his speed to the utmost, the narrow inferior surface, which has been before stated to bear some resemblance to the cut-water of a ship, and which would, in fact, answer the same purpose to the whale, would be the only part exposed to the pressure of the water in front, enabling him thus to pass with the greatest celerity and ease through the boundless track of his wide domain" (p. 28). When swimming at ease, the Sperm Whale keeps just below the surface of the water, and goes at about three or four miles an hour ; but on an emergency it is able to attain a speed of ten or twelve miles an hour : it then progresses by means of powerful lateral strokes of its tail, and alternately rises and sinks at each stroke. In progressing in this manner, the blunt anterior surface of the head never presents itself directly to the water ; the animal's body being in an oblique position, it is only the angle formed by the inferior surface which first presents itself, and this, which Beals likens to the "cutwater" of a ship, offers the least possible amount of resistance. When undisturbed, the Sperm Whale rises to the surface to breathe about once every hour. Beals says the regularity with which every action connected with its breathing is performed is remarkable ; the time occupied differs slightly in each individual, but each one is minutely regular in the performance of every action connected with respiration, so that the whalers know how long it will remain beneath the surface before reappearing to renew its supply of air. A full-grown "bull," he says, remains at the surface ten or eleven minutes, during which he makes sixty or seventy expirations ; after which he disappears, to return again to the surface in one hour and ten minutes. The blowing is not accompanied by any sound, and notwithstanding the wonderful accounts of its roarings and bellowings, the Sperm Whale may be said to be an absolutely silent animal. The females and young males are gregarious, but are found in separate herds or "schools," as they are called. A "school" will sometimes consist of five or six hundred individuals. The herds of females are always accompanied by from one to three large "bulls" ; but the full-grown males are said to be generally solitary in their habits, except on certain occasions, when it is supposed they are migrating from one feeding-place to another. The majority of those which occur on our coast are these solitary males ; when they visit us in herds, as mentioned by Sir Thomas Browne, they are all probably females or young males. The "bulls" are very fierce and jealous, and fight fiercely. The females show great attachment to each other and to their young, so much so that, one being wounded, the others of the herd remain and fall a comparatively easy prey. The young males, on the other hand, are very wary and difficult of approach, and should one be attacked, the others immediately take the alarm and retreat. The female produces one young one, rarely two, at a time, and breeds at all seasons of the year. Their senses of sight and hearing are very acute, and after being once unsuccessfully attacked, they are very difficult and dangerous to approach.

The food of the Sperm Whale consists almost entirely of *Cephalopode Mollusks* (cuttle-fish), although at times, when feeding near the shore, it has been known to take fish as large as salmon. It is, however, essentially a deep-water species, but how it contrives to capture such active prey as fish seems difficult to conceive. Beals is, however, of opinion that the Whale sinks to a proper depth in the sea, where remaining as quiet as possible, and opening wide its mouth, the prey are attracted by the glistening white colour of its lining membrane, curiosity leading them to destruction ; for no sooner have a sufficient number entered his mouth than the Whale, rapidly closing his under jaw, they are made prisoners and swallowed.

(*To be continued.*)

THE HISTORY OF SALAD PLANTS.

By H. G. GLASSPOOLE.

CRESSES.

CRESS is a general name of a number of plants, mostly, if not all, belonging to the *Cruciferæ*, and possessing, in common with the plants of the same order, pungent and aromatic qualities. The ancients, we are told, ate cresses with their salads to counteract the cold nature of lettuces and other herbs.

The garden cress, *Lepidium sativum*, appears to have been known to Theophrastus (see article in Rees's "Encyclopædia"), but the tribe of Nasturtium, to which the Water-cress belongs, was, no doubt,

most common in use. The Greeks thought that the warm and stimulating qualities of these plants put life and energy into persons with a sluggish temperament, and also brightened the understanding of those who partook of them: this circumstance gave rise to the Greek proverb, "Eat cress and learn more wit." Xenophon recommended the Persians to feed their children with cresses, which he said would make them grow tall, and be of more active habits. Pliny dwells much on the medicinal virtues of these plants, and recommends them to be eaten with vinegar as a remedy for those minds that were deranged. The garden cress is said to have been introduced into this country about the middle of the sixteenth century. Gerard mentions having received the seed of the curled cress, which is a variety, from his loving friend John Robins, of Paris. Thomas Cogan, in his "Haven of Health," tells us "that the often eating of this herb in salettes doth give sharpnesse and readinesse to wit." The native country of this plant was unknown until Dr. Sibthorp discovered it in Greece.

No British plant is in such popular request for salad as the Water-cress, *Nasturtium officinale*, the young leaves of which are supposed, like those of the Scurvy-grass (*Cochlearia officinalis*), to purify the blood, and therefore largely partaken of in the spring. Our old friend Gerard recommends young ladies to eat them as a restorative to the natural bloom of their faded cheeks. A decoction of its juice with that of Scurvy-grass and Seville oranges used to be given to children as a medicinal drink in the spring in days gone by. In Europe the water-cress appears to have been first cultivated at Erfurth, about the middle of the sixteenth century, but it was not until 1808 that it became an object of cultivation in England. About that period a Mr. Bradbery began to grow them for the London markets in the pretty valley called Springhead, Northfleet, Kent, with great success. In 1820 he removed to West Hyde, near Rickmansworth, where he had no less than five acres under water-cress cultivation. It is now extensively grown in the northern and eastern suburbs of the metropolis, and also at Cookham, Farringdon, and other places on the Great Western Railway, which line brings no less than a ton a week of this wholesome breakfast salad to London. Many hundred bunches are sold every morning in Covent Garden, but the largest share goes to Farringdon Market. The entire supply to the various Metropolitan markets cannot be less than from three to four tons per week (see Wynter's "Curiosities of Civilization"). The sale of this plant forms an important though humble branch of domestic commerce in our towns and cities. "Fine fresh Water-cresses!" is the first coster cry heard in a morning in the streets of London.

Water-cress contains chloride of potassium and sulphur in considerable quantities, and iodine occasionally.

The botanical name of the garden-cress, *Lepidium*, is derived from *lepis*, a scale, from the form of the seed-pouches; that of *Nasturtium*, from *nasus*, nose, *tortus*, torment, from the effects most of this genera have upon the muscles of the nose,—a name given to it by Pliny. In some counties these plants used to be called "Nose-smart" for the same reason. The word "cress," perhaps, may be derived from *cresco*, being a quick grower. In the last edition of the "English Botany" we are told that the word "cress" is found in various forms in all Teutonic languages. Some have derived it from the cross form of the flowers. Chaucer employs the Saxon form of the word *Kers*, to signify anything worthless:—

> "Of paramours ne raught he not a Kers;"

from which, perhaps, is derived the phrase of not caring a *curse* for anything.

THE ANNELID "DERO."

By R. Garner, F.L.S., &c.

The two little fresh-water Annelids, portions of which are figured at *a*, *b*, *c*, are very distinct from their allies, the Naids, of which, however, several species are often found with them; *Nais proboscidea*, for instance. *Dero* is the generic name appropriated to the present annelids. Though hardy, they seem to require a warm temperature, and those here described inhabit the slimy mud of a pool, into which hot water is constantly pouring from an engine. A dark green *Oscillatoria* also grows in the same mud, and thrives in a higher temperature than either the annelid or the hand can endure.

The peculiarity of *Dero*, and one which makes it a pretty object for the microscopist, is the expanded membrane or respiratory disk, situated at the posterior part of the body, having projections or processes upon it, and the whole strongly ciliated, thus presenting some resemblance to the *corona* of a Bryozoon, though the ciliated processes are fewer. This part, the undoubted respiratory organ, it is the habit of the little animal to protrude out of the mud in which it lives, and when the disk is expanded, the processes fairly extended, and the cilia in strong action, few objects are more striking. There is a difference between *a* and *b* and *c*, the former having a pair of antenna-like processes, which are not retractile.

Another interesting point, and one which from the transparency of the animal and the bright-red colour of the blood, is not difficult to investigate, is the circulation. Of this, investigation has already been made,* and all that we give here is solely what we have ourselves noticed. An abdominal vein running from the head, *f*, to the respiratory disk at the opposite extremity, *a*, receives the blood from the

* M. E. Perrier, "Comptes Rendus," 1870, an extract being given in Ann. and Mag. of Nat. Hist., fourth sec., vol. 6.

head, and from what may be termed a vascular *rete mirabile* enveloping the stomach and intestine, and is divided behind, *g*, and distributed to the branchial processes. From these, vessels again converge into a dorsal artery, following the undulations of the alimentary canal, and conspicuous from an intrinsic portions, two as above and a third behind, and the somites in the last portion have evidently been most recently formed.

A double abdominal nervous cord is plain enough all along below the longitudinal vein; the brain is less definitely seen; there are also two minute bodies

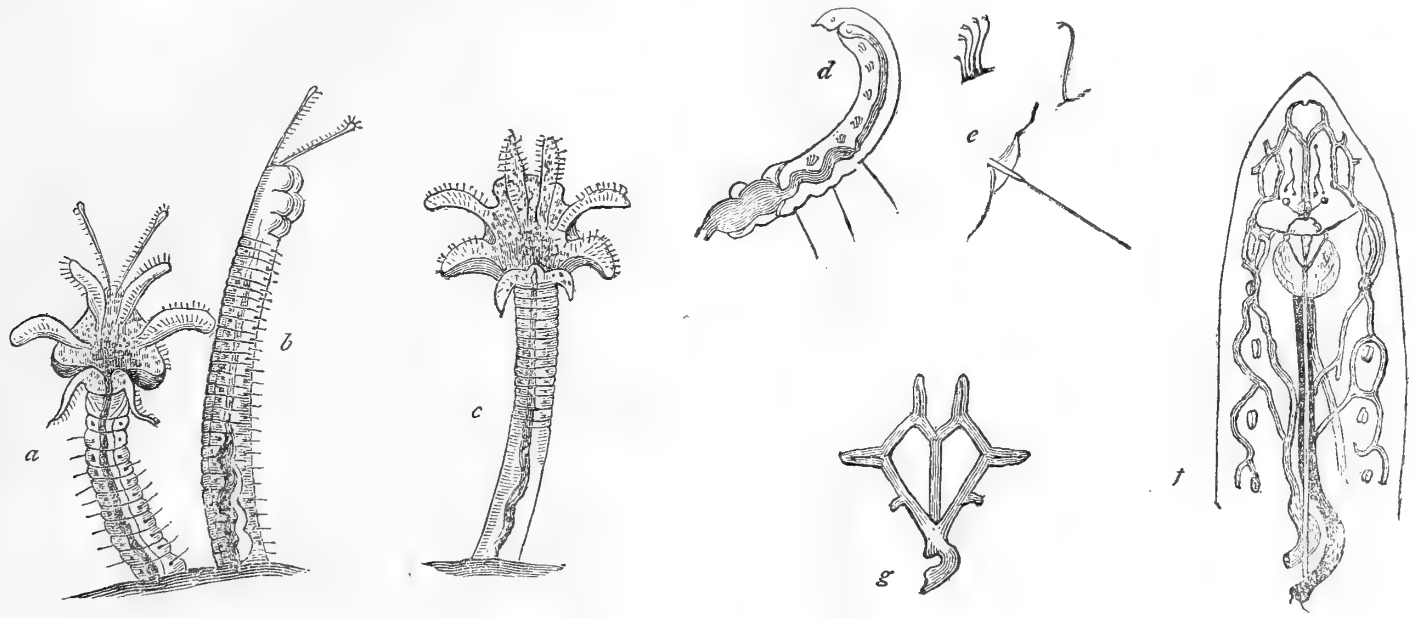

Fig. 5. Structure of Dero—a freshwater Annelid. *a, b, c*, posterior extremity; *d*, head; *e*, setæ; *f, g*, vessels of the head and branchiæ.

metility which the vein has not. The course of the dorsal vessel is somewhat the same as the ventral. When it lies above the middle part of the alimentary canal it forms the beautiful network already mentioned, and is, besides, connected in each somite or section of the body with large contractile loops, apparently distributing the blood to the viscera and parietes of the body, but, according to Perrier, not immediately connecting the two vessels. The little worm is well supplied with abdominal tufts of sigma-shaped hooks for crawling, and also with lateral or dorsal setæ for swimming, the former are bifid at their extremes, *e*.

The mouth, *d* and *f*, is furnished with a bulbous tongue, which can be protruded a little in feeding; both here and behind the alimentary canal is ciliated; there is some appearance of a stomach at about the seventh and eighth somite of the body, and here is the liver incorporated with the canal, and also in the same region the ovaries, &c.; the intestine is dilated in each division of the body, and connected by bands with its parietes.

We have no sufficiently matured observations to offer as to the development of the ova in the *Dero*. Perrier describes its fissiparous mode of increase, but the following account differs somewhat from him. Sometimes a long *Dero*, say of fifty joints, very evidently divides into two, a respiratory disk for the anterior secondary worm, and a head for the posterior one being formed at the place of disjunction; here the anterior portion, containing the ovaries, probably becomes the germ-mother, and perhaps winter-nurse. In other cases the individual *Dero* presents three

at the sides of the brain, probably acoustic, a few darker coloured spots more forward, and apparently lateral oral ganglia. The animal is sensitive to a very slight concussion of the vessel in which it lives.

PLANT-HUNTING AT BARMOUTH.

By J. Percival.

HAVING read with great pleasure the interesting notes of your correspondent Horace Pearce, F.L.S., of the flora of the neighbourhood of Cader Idris, I wish to add, by way of supplement, a few of the plants that came under my observation during the summer of 1876, for I find that he has omitted a great portion of the rarer species. Walking along the road in the direction of Llanaber may be seen *Parietaria officinalis*, *Echium vulgare*, *Clinopodium vulgare*, *Origanum vulgare*, *Euonymus Europæus*, and *Asplenium lanceolatum*. This latter plant may be found for a mile on old walls and rocks, and in far greater abundance than its near ally, *Asplenium Adiantum-nigrum*. It may also be found on walls overlooking Barmouth, and also for two miles on the Dolgelly road from Barmouth; turning into the harbour, a little short of a mile from Barmouth, it may be seen there very fine and abundant. A little further, on rocks facing the sea, may be gathered *Rubia peregrina*, or the common Madder; growing also with it is *Inula conyza*, or the "Ploughman's Spikenard"; another mile further on brings you to *Carex extensa* and *Tamarix Gallica*; and also *Spiræa salicifolia*: both the latter have, no doubt, been planted, but probably they are as wild

there as elsewhere in Britain. Half a mile further on, until coming to a large stream, going up the hill side, may be found *Carex binervis*, *C. lævigata*, and *C. fulva*, the latter in the greatest plenty. *Gnaphalium dioicum*, *Scutellaria minor*, almost in all swampy places, along with *Drosera rotundifolia*. Up this valley, I picked up of the Drosera an immense number of sports, varying from one to six and seven stems from the same root; others branched into several divisions at the top of the stem: I picked up about twenty of them, and scarcely two alike. Crossing over the

Fig. 6. Pellitory of the Wall (*Parietaria officinalis*).

hill from this point (say a mile up the valley) in the direction of Barmouth, my friend Mr. Roger, gathered a plant of *Onobrychis sativa*. On the hill-side overlooking Barmouth may be found *Geranium sanguineum*, *Dianthus deltoides*, and *Orobanche major;* and on an old wall nearly opposite the Corsygeddol Hotel may be gathered *Orobanche Hedinæ;* whilst on the rocks in the direction of Llanabers near the toll-gate, may be found *Veronica hybrida*. Proceeding along the high road for a mile may be found, in the greatest abundance, *Lathyrus sylvestris;* it also grows on the railway banks, both near Barmouth and at Friog. Along the coast may be gathered *Crithmum maritimum;* amongst loose stones in several places, and also very fine, two feet in height, on rocks exactly behind the pay-house. In crossing the bridge, *Polygonum Raii*, *Sclerochloa loliacea* and *rigida*. On the railway banks, about 400 yards from the station, grows *Mentha rotundifolia*, and in grassy flats, running parallel with the railway at this place, there are large quantities of *Juncus acutus* and *maritimus*. On Sept. 5th, 1876, I saw hundreds of

Fig. 7. Annual Dog's Mercury (*Mercurialis annua*).

Spiranthus autumnalis growing in the same flat with *Spergula nodosa* and a white-flowered variety of *Erythræa Centaurium*. *Erythræa latifolia* I have seen growing at Pensarn along with *Juncus acutus* and *maritimus*. *Convolvulus Soldanella* grows amongst the sand-hills near Barmouth, and in several places may be found *Mercurialis annua*, *Koniga maritima* abundant (probably an escape). *Malva sylvestris* and *rotundifolia* are both common plants. *Lavatera arborea* growing in several places on the coast; likewise may be seen *Sinapis nigra* and *Hordeum murinum*.

Crossing over the estuary, and getting on to the bog at Barmouth Junction, may be found *Phragmites communis*, varying in height from 18 inches to more than six feet. I have a specimen not 20 inches high, with roots and four perfect panicles; growing along with it is *Œnanthe crocata*, *Scirpus maritimus*, and *Typha latifolia*. The last-mentioned plants grow in the sluice by the railway-side, until one gets beyond Penman Pool Station from Barmouth. At the Barmouth side of the estuary, on the bog may also be

Fig. 8. Tree Mallow (*Lavatera arborea*).

found *Radiola millegrana*, *Osmunda regalis*, *Carex distans*, *C. flava*, *var. lepidocarpa*, *Drosera rotundifolia* and *intermedia*. Going on to Arthog Station, amongst the salt marshes, may be found *Statice Limonium* and *S. rariflora*, also *Sueda maritima* and *Salicornia* in the greatest abundance. *Œnanthe Lachenalii* and *Apium gravelens* both grow near Penman Pool Station, and, retracing my steps to the rocks, near Friog, growing in inaccessible situations, may be seen *Asplenium marinum;* and following the coast to the next village, Llangrwyen, near the station, I have found *Mentha viridis*, *M. piperata*, and *M. gentilis*, and also *Tanacetum vulgare*. By the road, in woods, are large quantities of *Hypericum androsæmum* and *Orobanche major*. In woods, at or near Barmouth Junction, at Arthog Falls, Torrent Walk, and several other places, I have seen *Hymenophyllum Wilsoni* in the greatest abundance. At the margin of the lakes, on the ascent to Cader Idris, from the Arthog side, I have seen *Hypericum*

Fig. 9. Broom-rape (*Orobanche rapum*).

elodes. I have also seen it in swampy ground near Barmouth. I have seen *L. selaginoides* in several places near small rills near Barmouth; and *Asplenium Ruta-muraria* grows very fine on an old wall leading from Dolgelly to Penman Pool; but out of reach, except by a ladder. Amongst mosses, the rarer species I have observed are *Entosthodon Templetoni* and *E. ericetorum*, *Bartramia rigida*, *Bryum alpinum* and *B. elongatum*, *Hedwigidium imberbe*, *Zygodon viridissimus* and *Z. conideus*, *Campylopus longipilus*

Fig. 10. Tamarisk (*Tamarix gallica*).

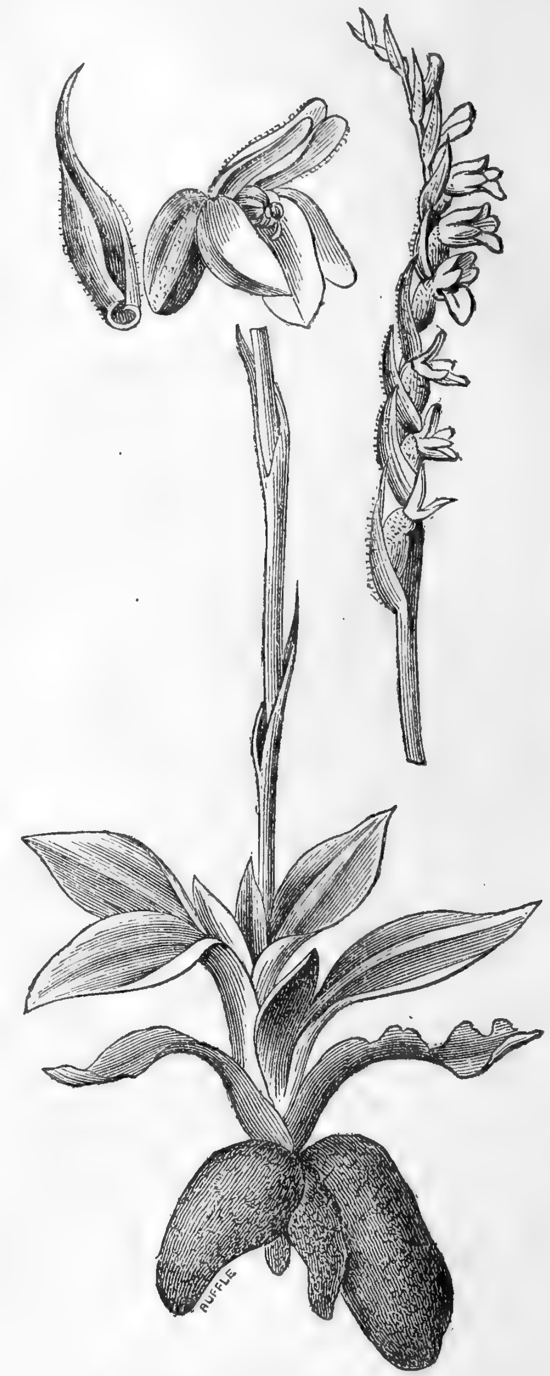

Fig. 11. Ladies' Tresses Orchid (*Spiranthes autumnalis*).

C. densus and *C. paradoxus*, *Rhabdoweissa fugax*, &c. *Asplenium viride* is found in ascending Cader, and *Lastrea æmulum* grows in woods near Penman Pool. —*J. Percival.*

MICROSCOPY.

An easily-made Cell.—The "American Journal of Microscopy" gives the following excellent recipe for constructing cells:—"A cell which we have found very durable, easily and quickly made, and very neat, is constructed as follows: Having procured some good gold size and pure litharge, grind the latter to a very fine powder. Mix the litharge and gold size to the thickness of cream, and colour either black or dark olive by adding lamp-black. With this paint, as it may be called, make as many cells as are wanted, and when made, dust finely-powdered litharge over them until they are covered a sixteenth of an inch deep; allow them to stand a few minutes, and then shake off all the loose litharge by means of a few smart taps. The surface of the cell will now be quite rough. Allow it to stand a few hours, and then press it against a plate of glass. If this be done carefully, a smooth, solid ring will be left on the slide. If the edges should not be as smooth as they ought to be, it is easy to trim them off on the turntable by means of a small chisel. Such cells, after a few weeks, become very hard, and may be finished so as to be very neat. For dry objects they leave nothing to be desired, and as we have had them in use for over five years, we can speak as to their durability. For objects mounted in liquids it will be necessary to coat them with suitable varnish. Thus, for saline liquids, a coating of gold size renders them perfectly impervious. For glycerine use Bell's cement, or a solution of shellac in alcohol."

THE MONTHLY MICROSCOPICAL JOURNAL.—We have received a copy of the November and December number of this well-known journal, containing a very brief account of the death of the late Editor (Dr. Lawson), and a notice that the present number is the last of the series, and that henceforth the Royal Microscopical Society intend to publish their own Transactions, after the manner of the other learned societies.

THE "SPONTANEOUS GENERATION" CONTROVERSY.—At a recent meeting of the Royal Society, Professor Tyndall referred to some hermetically-sealed flasks opened on the Alps, which, he thought, set this controversy at rest. Professor Tyndall stated that he took with him last summer to the Alps sixty hermetically-sealed flasks, containing infusions of beef, mutton, turnip, and cucumber, which had been boiled for five minutes, and hermetically sealed whilst boiling was going on. The flasks were kept for six weeks and were then opened, some in *haylofts* and others near precipices. The two groups of flasks were then placed in a kitchen, where the temperature was from 65° to 90° Fahr. The result was that twenty-one out of the twenty-three flasks opened in the hayloft were filled with organisms, whilst *all* the flasks opened near the edges of precipices remained as clear as distilled water!

SPHÆRAPHIDES.—I have found the following a very simple and efficient method for procuring sphæraphides from rhubarb when not required to be viewed *in situ*:—I take a piece of rhubarb and separate the fibres into several small pieces, lengthwise, then allow them to remain for a few days until moderately dry. If rubbed together over a sheet of note-paper, the matter thus obtained may be collected on a slide: it will be found to consist principally of detached *sphæraphides*. The few particles of fibre may be easily removed with a camel-hair pencil. They can then be mounted, when dry, as opaque objects or in Canada balsam, as required.—*W. H. Harris.*

BIRTH OF VINEGAR EELS.—While occupied, a few evenings since, with the microscope, examining an eel from some vinegar, I was the fortunate witness of an interesting event. I had, by the cap of the live box, caused a sufficient amount of pressure to keep the worm still, when a segment, about the centre one, ruptured and allowed the egress of a twin. The pair were, in all respects but size, precisely similar to their parent. I do not find any mention of the like occurrence in Dr. Carpenter's very excellent and interesting work, "The Microscope," very little being written about *Anguillulæ aceti* in the chapter devoted to *Annulosa.*—*W. H. S.*

THE LATE DR. BEATTY.—We are sorry to notice the death of Dr. Beatty, of Baltimore, at the early age of 40 years. Dr. Beatty was a valued contributor to our pages, and microscopists are under a debt of gratitude to him for the elaborate articles he published in these columns on "Decolouring and Staining Vegetable Tissues."

CLEANING SLIDES.—I have seen very frequently in different books, plans, troublesome and awkward, for cleaning the balsam off slides. Why do not people just wash them with rectified naphtha? The balsam is removed instantly. The hardest and oldest, when thick, only requires the naphtha to be warm; but all that can be should be scraped off first. In this way it is the easiest thing possible. I have used it for slides and lenses for many years.—*Edward Thos. Scott.*

TO CLEAN OLD SLIDES.—The following has been my plan for years, and is simple, easy, and efficacious:—Warm the slide over a spirit-lamp to remove the covering glass which, place in a water-glass with benzole. Scrape off as much as you can of the balsam, or whatever it may be, from the slide, and *wash with benzole*, and use an old silk pocket handkerchief, which I dip into the benzole, a very little of which is sufficient.—*John Bramhall.*

TO PRESERVE GLASS SLIPS READY FOR USE AFTER CLEANING.—As it is most inconvenient to make each slip chemically clean at the time it may be wanted for mounting a specimen, doubtless most of your readers clean a quantity (say half a gross) at a time; but then probably they have often, in common with myself, experienced the inconvenience of their again getting dirty before they are used, through their lying about in a drawer or on the table of the laboratory. To obviate this difficulty, I have recently adopted a method which is simple, and, at the same time, so effectual, that the slips may remain for months covered with dust and dirt, and yet be clean and ready for use whenever they are required. It is this:—After cleaning, the slips are arranged side by side, with their flat surfaces in approximation, when a ready-gummed piece of *silver or tissue* paper,* 10 inches long by a width which varies according to the number of slips, is affixed to their edges in the same fashion as the sheets of paper in a drawing-block are joined together, so that, although they are firmly attached to each other by their edges, their surfaces are left uncovered. The block thus bound is left to dry, when each slip may be detached by running the thumb-nail round its edges. The surface next the adjoining slip should be used for the preparation to be mounted as it is, of course, quite clean, although the other (or exposed one) may have become dirty; the fragments of tissue-paper being removed after the mount is completed.—*J. W. Groves, London.*

* Any other paper is so thick that it is difficult to separate the slips without the use of a knife.

How to Clean Thin Covers.—The difficulty of cleaning very thin covers without breaking them is very great. It is almost impossible to handle them in the fingers, and when they are rubbed between two plain blocks covered with chamois leather, it is difficult to clean more than one side, since one particular side will always stick to the leather next it, and the other side only will be subjected to friction. Mr. Jones has devised a very simple method of overcoming this difficulty. Into a brass cylinder he fits a heavy plug, the lower end of which is covered with chamois leather. When a thin cover is placed on a piece of stretched chamois, and the tube placed over it, the under side only of the cover is subjected to friction, and consequently a few rubs suffice to clean it thoroughly. The tube is then raised, the cover turned over by means of a delicate pair of forceps, and the other side is cleaned. The pressure of the plug is so even that there is no risk of fracture, even with the most delicate covers.

ZOOLOGY.

Dublin University Biological Association.—We have received three parts of the first volume of the "Proceedings" of this well-known society, containing some very valuable and well-written papers, among which are the following:—"The Leaf Structure of *Begonia*" and "Irish Fungi," by Greenwood Pim, F.L.S.; "Some Curious Marine Forms," by Prof. Macalister; and "Papers on Anatomical Irregularities," by Mr. Malet and F. O. Ross, &c.

Arctic Birds.—At a recent meeting of the Zoological Society, Mr. Henry Seebohm, F.Z.S., exhibited and made remarks upon some of the rarer Eggs and Birds which he had obtained during his recent visit to the Arctic regions of the Yen-e-sey, in Eastern Siberia, and gave a rapid sketch of his journey. Some of the skins were interesting from the fact that they extended our knowledge of geographical distribution; such as, *Phylloscopus trochilus* and *Acrocephalus schœnobænus*, from long. 88° E., *Anthus Gustavi* of Swinhoe (*A. Seebohmi* of Dresser, *A. batchianesis* of Gray) from the same longitnde, and young in first plumage of this species.

The Leeds Naturalists' Society.—We have received a copy of the Report of this Society, and are delighted to find it in vigorous health, and with a good programme of work before it for the forthcoming year. May we suggest to the secretaries of *Provincial* Natural History, Microscopical, and other societies, that they should send us the names of officers, &c., of their societies, so that our volume for 1878 may be a kind of "Science Directory," for provincial scientific societies?

Rose-coloured Pastor or Thrush (*Turdus roseus*).—A specimen of this rare bird was obtained this year in the north-west of county Donegal, Ireland, where it was captured alive in the garden of the Gweedore Hotel, which is situated about four miles from the coast of the Atlantic. It unfortunately died a few hours after its capture, whilst being conveyed in a basket to the residence of Lord George Hill, the owner of the hotel. This is not the first instance of this beautiful bird being found on our shores. Thompson, in his "Birds of Ireland," informs us of one or two specimens being shot in the neighbourhood of Hillsborough, county Down, some thirty or forty years ago. Perhaps some reader of Science-Gossip could furnish us with other instances of its appearance, either in Ireland or England, which may have come under his notice, and which would be interesting to all lovers of birds.—*Shelah.*

Sagartia sphyrodeta.—A specimen of the beautiful golden-disked variety of this anemone in one of my tanks has twice undergone spontaneous fission within about seven weeks. The original specimen had been in my possession nearly twelve months, and by care and regular feeding had increased from about the size of a fourpenny-piece, when fully expanded, to nearly that of a florin. Previously to its first division, I had noticed for several days that the base had been growing more oval in outline, and, to my surprise, on the morning of September 10th, I found it divided into two, right across the centre. The severance was not quite complete when I first discovered it, but became so in course of a couple of hours; the two portions dragging themselves away from each other, until they were about half an inch apart. The severed edges of each gradually closed together, a suture was formed, and in course of a few days I had two perfect anemones. These have thriven well, fresh tentacles have been produced, and both have increased in size, till last week I noticed that the larger of the two, which I suppose must be considered the parent anemone, was again elongating its base, as if contemplating fission. About noon of the 31st ult., I had the satisfaction of seeing that the process had begun, and watched it at intervals till completed. The base appeared to separate into two lobes, which gradually dragged away from each other, making a rent which extended upwards, till only the mouth formed a connection between the two. This eventually gave way, and the fission was complete, the whole performance occupying about five or six hours. A few acontia were thrown out, but these were soon withdrawn, and the healing process commenced. Two days later I was feeding my stock, and offered food to the two halves, both of which seized it greedily, but soon expelled it through the partially healed rents in their columns. I shall watch the further increase of my specimens with great interest, as the species is one of the hardiest and most beautiful tenants of the aquarium with which I am acquainted. It feeds well, is almost always expanded, thrives in a comparatively small

body of water, and the contrast between the brilliant yellow disk and the pure white tentacles is very pleasing. Like most other anemones, it opens best at night, and should not be exposed to too strong a light; mine are kept in a north aspect, and the colour of the disk is as brilliant as when I first had them. The same remark applies to the highly-coloured varieties of *S. troglodytes*, which are very apt to fade. —*Edward Horsnaill, Dover.*

A FIVE-WINGED BUTTERFLY.—At a recent meeting of the Entomological Society Mr. Meldola exhibited a five-winged specimen of the Sulphur Butterfly (*Gonopteryz rhamni*), which had been taken in Norfolk by Mr. John Woodgate. At the same meeting Mr. H. Goss, F.L.S., showed a specimen of the Sulphur Butterfly, in which the left wings were those of a male, and the right those of a female.

DESTROYING MITES.—In reply to A. F.'s query as to destroying mites in a cabinet of Lepidoptera, I find the best and simplest method is to saturate a piece of blotting-paper in chloroform (methylated is cheapest); place it in the drawer infected, and close securely, repeating the operation two or three times, at intervals of a few hours. If the drawer be tolerably air-tight, this will effectually destroy the mites, but it should be carefully watched for some time afterwards, in case of fresh mites coming into existence from eggs, upon which the chloroform would not take effect. Camphor should be kept in the drawers of a cabinet, and renewed as fast as it evaporates—it will keep mites away; but if they are *introduced* with new specimens, or otherwise, they will exist in spite of the camphor. All fresh acquisitions should therefore be put in quarantine before being placed in the cabinet. Instead of camphor, a very good recipe is, equal parts of "oil of thyme, oil of anise, and spirit of wine," applied as I have described for chloroform and renewed as often as the scent goes off: it must not be allowed to touch the lining of the drawer, as it will stain the paper.—*H. Miller, Ipswich.*

THE BERLIN GORILLA.—Poor "Pongo," who returned to Berlin to die, after holding his levees at the Westminster Aquarium, has been *post-mortemed* and dissected by Professor Virchow. His death was ascertained to be due to acute inflammation of the bowels,—the same disease which carries off young children so rapidly. Even in his very diseases, therefore, the Gorilla claims an affinity with man!

CHAMELEON-LIKE CHANGES IN THE FROG.—The changes of colour noticed by "J. J. M." in the frog are truly chameleon-like, and, together with similar changes seen in fish, are brought about by the same mechanism. The skin of these animals contains branched and ramified cells pervaded with fine granules of a dark-coloured pigment. Similar cells are found in certain parts of the human eye, and without the pigment in all parts of the body, in the so-called "connective tissues." They can nowhere be better seen than in the preparation of frog's web used to show the circulation. In such an object many cells may be seen as mere black spherical patches, whilst others cover a larger surface and show the branches, joining similar ones from other cells. Now under various stimuli, applied either to the cutaneous surface or through the eye, the branched patches of pigment may be made to contract with the spherical form, whilst other stimuli have the reverse effect. Inasmuch as the cell-branches join one another, they obviously cannot contract; it is the contained pigment-bearing protoplasm that shrinks out of the branches and forms the globular mass. Obviously, when such a change occurs in the greater number of the cells present, a change in the colour of the animal must result. It has, moreover, been proved that this change can only be brought about so long as the animal's power of sight remains. Destruction of the eyes renders the pigment masses immovable. Section of certain nerves has a like effect. When any of these animals are pursued by their enemies, they are thus enabled, by rendering themselves pale and therefore less easily seen, to elude their would-be captors. Emotions other than fear may also, perhaps, be expressed by this means, and not only can some creatures render themselves pale, but actually approximate their colour to that of their surroundings. Such is the permanent state of very many animals; this condition being brought about by natural selection, *e.g.* lions, sand-colour; muddy water fish, mud-colour; green, sloths, &c. &c. Pallor, as an expression of human terror, brought about by a contraction of small blood-vessels, may have had a similar cause, it at least seems analogous. —*D. A. K.*

HOLES IN THE HEAD OF PIKE.—The apertures on the head of the common pike (*Esox lucius*) are the openings of follicles, or mucus-secreting glands. Similar but smaller openings may be found along the lateral line that separates the dorsal from the ventral half of any fish. These openings form an uninterrupted series, from head to tail, and constitute the opening of muciparous ducts that may be seen as white threads by the naked eye on dissection. The function of these glands is obvious; they secrete the mucus by which the integument of the animal is lubricated, and probably act also as sweat-glands to excrete waste products from the system.—*R.*

NEW HABIT OF RED GROUSE.—It does not matter whether Mr. Dixon or Mr. Dealey claim the honour of calling the attention of naturalists to the habit of Red Grouse perching on trees. It is a habit that all persons who reside near the moors (who take any notice of the habits of birds) are familiar with. I saw them perching on trees and hedges years before the time they say they first observed them.—*James Ingleby.*

BOTANY.

ASPLENIUM SEPTENTRIONALE AT DOLGELLY.—It has been known for some years amongst a few lovers of nature that not only *Asplenium septentrionale* but also *A. germanicum*, Weiss, grew in the Dolgelly district, and it has only been from a desire to preserve the plants from extirpation that the habitat has not been made public. Now that it is known, it may be well to place the discoverers' names on record. *Asplenium septentrionale* was discovered in 1867 growing on an old wall not far from the river Mawdach, by Mrs. Chamberlain Barlow, of Edgbaston. The plants of it (two only I think) were of course spared, and for some months I saw them every time I passed the locality, peering stealthily at them, for fear they should be discovered by some ruthless collector, and believing at that time they were the only plants in the country. After a considerable interval, when I revisited the spot, the wall had been altered or repaired, and the little ferns had disappeared. Some time afterwards the Rev. W. Foley Vernon, of Shrawley, searched the crags on a hill that rose up behind the old wall, and had the pleasure of finding both *A. septentrionale* and *A. germanicum* in tolerable abundance, and I have a fine-grown plant of each which I owe to his kindness. I enclose a few fronds. May I ask your botanical contributors if they know of any locality where one only of these two species is indigenous without the other occurring somewhere in the immediate neighbourhood? An acute observer has informed me that they are always found together, and suspects a more intimate relationship than is generally supposed to exist between them.—*T. Belt.*

GENTIANA ACAULIS (L).—Without in the least wishing to impeach the veracity of Mr. Colebrook, especially as he is "as certain as he is of his own existence," that this plant was growing upon Cader Idris in August, 1862, I would inform him firstly that, so far as my experience goes, the *G. acaulis* of the Swiss Alps is in its full bloom towards the middle of June, and completely and entirely over by July, ripening its seed in that month. Its place is then taken by *G. bavarica*, and others of that section, as well as *G. campestris*, *Germanica*, and *Amarella*, which are essentially *August* flowerers. With regard to the remarks, "the present plant has no stalk, whence its name *acaulis*, but cultivated in gardens it becomes [*sic*] one,"—does Mr. Colebrook here intend to make a playful allusion to its peregrinatory powers, as well as origin, the word *stalk* being a double-entendre in the sense of a *stalker*. I believe *G. acaulis* was found at Staffa in the month of June, 1834–5; but doubtless it had escaped from cultivation, as the plant has never been seen there since that time. Concerning the subject of Mr. Colebrook's other query—*Cotoneaster*—I obtained it in the month of June, 1874, from the one situation on the Great Ormeshead, where it is still to be found; and I must say that had I not been guided to the spot by one who knew it well, I might be still searching, but in vain, for it. Associated with it, in the clefts of the limestone rock, was abundance of the local *Potentilla verna*.—*J. C. M.*

GENTIANA ACAULIS.—I have been interested in reading the remarks on this plant that have appeared lately in the pages of SCIENCE-GOSSIP. Many years ago I came across what I had no doubt was *Gentiana acaulis*, growing in tolerable profusion, and, as might be supposed, truly wild on the downs between the Needles and Freshwater, in the Isle of Wight. It was a small plant, without stalk, about 1½ inch high, half of which comprised the large bright blue flower. At that time I was not aware that *Gentiana acaulis* was "not a native," so I made sure of my prize, and gathered as much of it as the strong wind blowing at the time would suffer me to do. On subsequent examination and reference to Sowerby's "English Botany" and other authorities, I came to the conclusion, and I believe rightly, that it was the veritable *Gentiana acaulis*. A little further down the slopes of the hill, upon the same occasion, I came upon *Gentiana Amarella*, so I had an immediate opportunity of comparing the two flowers and observing the wide difference between them. Some time after this I became aware that the lovely little *Gentiana acaulis* had been excluded by botanists from its former place in the British Flora, and I have often wondered since how it came to pass that its beautiful blue flowers had found that accidental lodging far away from houses and gardens, up on the wind-blown heights of the Freshwater Downs. I have never visited the spot since, and I should be glad to know whether any of the readers of SCIENCE-GOSSIP have, like myself, ever met with it in their wanderings in that locality.—*Isabella H. Knox.*

PLANT CHEMISTRY.—Professor Church has examined the colouring matter of the well-known bordering plant with variegated leaves, *Coleus Verschaffeltii*, and thinks that it is identical with *œnobin*, the colouring matter of red wines, as well as with other substances extracted from blue and purple flowers.

SOLANUM DULCAMARA.—Can any of your readers give me any information as to the properties of the berries of this plant? "Chambers's Encyclopædia" says, "red berries of tempting appearance, which, being poisonous, are not unfrequently the cause of serious accidents, particularly to children." Garrod, in his "Materia Medica," says he has administered half a pound of the ripe fruit as a conserve, and without any definite effect. Buffon says "the scarlet berries are not poisonous, five pounds weight given in the course of ten days did not produce poisonous

effects"; but neither of these authors says if the berries were swallowed by man or beast. I think I should have a difficulty in finding any one who would eat even two or three berries, as they are almost universally considered poisonous.—*Dr. Morton, New Brompton, Kent.*

HYBRID PRIMULA.—The frequent tendency of the Primrose family to hybridize often causes a difficulty in determining a plant and its varieties. The *Primula elatior* is by some supposed to be a hybrid between the *P. veris* and the common primrose; and Sir William Hooker "was not satisfied that the *Primula elatior* of Jocquin was really distinct from the numerous hybrids between *P. vulgaris* and *P. veris.*" In one locality near Geneva I found both growing together in abundance, producing different forms of hybrids, some approaching one parent plant and some the other. Many Swiss botanists call the *P. vulgaris acaulis*, as it appears to be stemless, with a variety β, which, as having an evident, though very short, stem or scape, they place the Primulas in two divisions, as "espèces légitimes capsule fertile," and "espèces hybrides capsule avortée": under the former they include *P. veris*, *P. vulgaris*, and *P. elatior;* under the latter, *Primula acauli-officinalis*, *P. acauli-elatior*, and *P. elatiori-officinalis.*—*T. B. W.*

ANOMALOUS PARTS OF PLANTS.—I gathered some *Trifolium repens* this last summer at Esholt, near Bradford, the calyx segments of which were transformed into leaflets; in some of the heads all gradations betwixt leaflets and calyx segments could be observed. I afterwards gathered some in Chee Dale (Derbyshire), in which all the calyx segments were converted into leaflets, some of the latter being on petioles several times the length of themselves. Two friends of mine have noticed this also, but I have not seen it recorded. I gathered some specimens of *Claytonia perfoliata* at Bakewell, in all of which the leaves that are usually perfoliate were not so at all. The several text-books I have been able to consult (including Symes) do not give any habitat for this plant: the specimens I gathered were growing amidst *Chrysosplenium oppositifolium* in the middle of a wood, which appeared a very unlikely place for its introduction as a weed of cultivation. I collected also in the same wood a *Myosotis*, having the corolla nine-partite. Near Bradford I gathered *Silene inflata* with two complete flowers (except the calyx) in one calyx; also in this neighbourhood, *Lolium perenne*, in which the spikelets were transformed into spikes. Near Leeds I collected *Juncus bufonius* in a viviparous state, like that which *Juncus supinus* often assumes; but I have not seen this state recorded. I gathered a specimen of *Lychnis diurna* near Miller's Dale, in which the stamens were transformed into petals. At Eldwick, near Bradford, I got a specimen of *Orchis maculata*, which agreed with the description of that plant in every particular save the lip, which was about twice as long as usual and strap-shaped, with parallel sides, tridentate, the central lobe being less than the others. I have received from Scotland a specimen of the common Dandelion, the peduncle of which is furcated, bearing two capitula.—*Wm. West, Bradford.*

INFLORESCENCE OF GOURDS AND PUMPKINS.—In SCIENCE-GOSSIP for November was an interesting note on the above topic by John Gibbs. He notices that the fruit on fertile blossoms appear first—before the sterile blossoms on the same plant. In this country (Michigan, U.S.A.) I have often noticed many staminate or sterile flowers open before a single pistillate flower had opened. This I have repeatedly seen in case of Hubbard squashes, summer squashes, and several varieties of cucumbers. I do not make this assertion as doubting what Mr. Gibbs has said, but as a curious difference. If he is correct, perhaps our warmer and drier summers may have something to do with it.—*W. J. Beal.*

GOURDS AND PUMPKINS.—The fact to which Mr. Gibbs calls attention is one of considerable interest. The separation of the sexes is common enough in flowering plants, and in the Gourd tribe is of two degrees: on distinct flowers (monœcism), or on distinct plants (diœcism). It has also been noticed in these delicious flowers, as well as in those structurally "hermaphrodite" or "monoclinous," that the sexes are sometimes developed simultaneously (synacmic), sometimes successively (dichogamous); but of the two possible cases of the latter—at least in "monoclinous" flowers—the precedence of the male (protandry) is far more frequent than examples similar to the one Mr. Gibbs describes (protogyny). This might be expected in single flowers, since the stamens occupy an older whorl than the carpels; at least, are generally believed so to do. But when we come to diclinous plants, new interests arise. A most careful and assiduous American observer, Mr. Thomas Meehan, of Philadelphia, has shown that there is a close relation between sex and energy, and that female flowers are more characteristic of strong shoots than male. Might we not, therefore, expect a plant to produce male flowers only after its energy has been to a certain extent exhausted in producing female ones? Numerous cases are on record, especially of figs and oranges, of the swelling of the "fruit" without the fertilization of the ovule: it would be interesting to learn if this ever is so with gourds. Of course, however the "fruit-blossoms" may "make haste," they cannot set seed without pollination. In this case, the pollen must be derived from another plant probably, perhaps from another situation where different conditions make gourds flower earlier; so we may have here an illustration of Mr. Darwin's rules that, while pollen from another flower of the same plant is little, if at all, better than that of the same flower, pollen from another plant is an advantage, and if

from one grown under different conditions, even still more so. I hope Mr. Gibbs will continue his observations. He could not have a more interesting or practical subject.—*G. S. Boulger.*

Fertilization of Flowers.—Dr. Müller has called attention to the occurrence, in some of the *Labiatæ*, of two distinct forms, one with larger hermaphrodite protandrous flowers, and the other with smaller female flowers. He shows that the latter can only be fertilized by the former, and that they disappear when the former are not present. We would suggest that our botanical readers should devote their attention during the coming summer to the analytical structures of well-known and abundantly-represented orders of plants; and, further, that they should also note the kind of insects which frequent them, and whether these insects affect any special colours of flowers.

GEOLOGY.

Prehistoric Man in Japan.—Mr. E. S. Morse sends a note to *Nature*, in which he gives an account of the Kitchen Middensat Omori, in Japan, which contained arrow-heads, bone implements, but no flint or stone weapons. Mr. Morse believes these large shell mounds were accumulated by a prehistoric race of men in Japan.

The Insect Fauna of the Palæozoic Period.—Mr. Herbert Goss, F.L.S., has read a paper on the above subject before the Brighton and Sussex Natural History Society. This makes the third of Mr. Goss's papers on fossil insects, and it is equal in character to its predecessors. In these three papers the geological student is possessed of a most valuable generalization of all that is known on fossil entomology.

Jointed Limbs in Trilobites.—Mr. C. D. Walcott has just figured and described jointed limbs in the genera *Calymene* and *Ceraurus*, from the Trenton limestone. *Calymene senaria* showed axial appendages with three joints. In *Ceraurus pleurexanthemus* the limb was five-jointed. The legs ended in a single blunt end, and Mr. Walcott thinks these trilobites will be found to have five or six joints with a terminal claw. He further thinks that the discovery of these limbs more closely than ever associates the Trilobites with the King-crabs and Eurypterids.

The Cumberland Association of Literature and Science.—A copy of the Transactions of this vigorous natural history and literary society has been sent us, and it is a pleasure to find so high a degree of culture so far removed from the centres where culture is supposed to be especially confined. But the development of local science is nearly always dependent upon the personal interest taken in it by a few men, and there can be little doubt that the great success of the Cumberland Association during the last two or three years is mainly due to their possessing such an indefatigable secretary as Mr. J. Clifton Ward, F.G.S., of her Majesty's Geological Survey, the author of a number of remarkably suggestive papers on Geology and Physical Geography.

Artificial Precious Stones.—MM. Fremy and Freil have recently been experimenting on artificial productions of corundum, ruby, and other crystallized silicates. They showed that in a crucible of refractory earth they put a mixture of equal weights of *alumina* and *minium* and calcined them for some time at a red heat. After cooling, they found two layers, one vitreous (formed chiefly of silicate of lead) and the other crystalline, and often presenting geodes full of beautiful crystals of alumina. To obtain the red colour of ruby, about two or three per cent. of bichromate of potash was added to the mixture of aluminia and minium. A silicate of aluminia was produced by heating for some time a mixture of equal weights of silicon and fluoride of aluminia.

Precambrian (Dimetian and Pebidian) Rocks in Caernarvonshire.—At a recent meeting of the Geological Society, a paper on this subject was read by Dr. Hicks, F.G.S. The author gave an account of the special examination of the great ribs of so-called intrusive felspathic and quartz porphyries which are found associated with the Cambrian rocks in Caernarvonshire, made by him in company with Professor Hughes, Mr. Hudleston, and Mr. Homfray last summer. He described sections at and near Moel Tryfan and across the mass from Pen-y-groes to Talysarn, in which he showed that instead of being of an intrusive nature, as hitherto supposed, the whole, with the exception of a few dykes at those parts, is made up of bedded volcanic rocks, lavas, breccias, &c., similar to those found in the Pedibian series at St. David's, and that the Cambrian rocks, instead of being intruded by this mass, rest everywhere upon it unconformably, and the pebbles in the conglomerate of the Cambrian at the base are, as at St. David's, identical with, and must have been derived from, the rocks below. Similar results were obtained in the examination to the north and south of Llyn Padarn, and the conclusion, therefore, at which the author has arrived with regard to the great mass which extends from Llanellyfine in the south to St. Ann's chapel in the north, is that it is entirely Precambrian, and that it belongs to the series described by him under the name Pebidian at St. David's. The other mass, extending from Caernarvon to Bangor, he considered also entirely Precambrian; and from the mineral characters exhibited by a portion of this mass directly behind Caernarvon, he thought it would prove to be, at least at this part, of Dimetian age. The altered beds near Bangor and their associated quartz felsites he

considered entirely of Pebidian age, as there is no evidence that the Dimetian rocks are exposed there. Afterwards, Professor Hughes read a paper on the Precambrian rocks of Bangor, which consist of slates, agglomerates, and porphyritic rocks; and these, he thinks, are equivalent to Dr. Hicks's "Pebidian."

PALMAM QUI MERUIT.—The Royal Society of England have just awarded Professor James D. Dana, the distinguished American mineralogist and geologist, their highest honour, the "Copley Medal." The "Royal Medal" went to Professor Heer, the equally distinguished fossil botanist, of Zurich.

A FOSSIL FUNGUS.—A very interesting article in your last number, which is headed "A Fossil Fungus," refers to the discovery of a fossil fungus in Lepidodendron, by Mr. Carruthers, and its subsequent study and classification by Mr. Worthington Smith. It is there stated: "This is, perhaps, the oldest fungus on record." As this is not quite correct, I beg to inform you that in 1858, C. Wedl found something very much like *Saprolegnia ferox* in a *Leptæna* from the Devonian. In May, 1876, I read a paper before the Geological Society, in which unicellular algæ were described parasitic within a foraminifer from the Lower Silurian, a coral from the Upper Silurian, in brachiopods, and corals from the Devonian, and from a coral in the Miocene. I named and figured this penetrator *Palæachlya perforans.* In the Proceedings of the Royal Society, No. 174, 1876; I explained the physiology and morphology of *Achlya penetrans,* now found in recent corals and shells, and explained the life cycle of this *saprolegnious* plant, so that, from its almost complete resemblance with the ancient form, it could be considered its descendant. The septa, which are said not to occur in the mycelium of *Saprolognia* are really seen very rarely, but still they do exist.—*P. Martin Duncan.*

ERRATUM.—In my last paper on the Carboniferous Polyzoa, December 1877, the reader will oblige by correcting the following: page 272, 8th line in list, *G. flesicannala* read *G. flexicarinata.* Page 273, 1st col., 11th line from top, for "genus" read "family."—*G. R. V.*

NOTES AND QUERIES.

THE PAIRING OF BIRDS.—Is it sufficient proof of birds pairing for life, that we find the old nests tenanted year by year? Some birds are known to use the old nests of other species; *e.g.*, the House Sparrow, which is one of the species which, upon this evidence, Mr. Dixon quotes as pairing for life, frequently uses the old nests of the House Martin; and if of other species, why not of the same species? I fail to see why Mr. Dixon supposes that polygamy tends to prolificness: it can only do so if the number of females born, or arriving at maturity, be in excess of the males. Among mankind, as men and women arrive at adult age in about equal numbers, if one man have two wives, another must go without one, and it is obvious that both the procreative power, and what is probably of more importance, the power to maintain offspring of two males, will be greater than that of one male. Polygamy can only tend to a more rapid increase of population where the number of females is much in excess of that of males, either through female immigration, as in the Mormon settlements, or, as more usually happens, through the greater mortality of males. It is hard to believe that nature has been so considerate to mankind as to make fowls polygamous in order that the superfluous males may afford us food. It seems more reasonable to suppose that the habit of polygamy is in some way advantageous to the polygamous species itself. Polygamous animals are usually provided with special weapons of offence, like the cock's spur, and are in the habit of fighting for the females: the strongest and best-armed male wins the largest number of fair prizes, and the progeny of such a male are likely to have the advantage over their competitors in the struggle for existence. It does not seem difficult to explain why species which are monogamous in the wild state should be polygamous in captivity. Given an excess of females over males, and in the absence of social and moral restraints, polygamy follows as a matter of course.—*H. F. Parsons, M.D.*

PAIRING INSTINCTS OF BIRDS.—If birds returning to their old nests *is* a sign that they pair for life, I may add to Mr. Dixon's list the Blackbird (*Turdus merula*), for a nest has been occupied successively for the last three years by a pair of these birds. Now as there are two or three other nests in the same hedge, I think it must be the same pair that has successfully reared three broods in the one nest. Perhaps Mr. Dixon—since he has been observing particularly the pairing instincts of birds—could kindly give me some information as to one species of bird pairing with another (*see* SCIENCE-GOSSIP, p. 263). I have known instances of hybrid grouse, but never of a hybrid between a blackbird and a thrush.—*G. F. B.*

MITES IN A COLLECTION OF LEPIDOPTERA.—In reply to the query in the December number of SCIENCE-GOSSIP I beg to say that, having had the misfortune to find mites in my collection of Lepidoptera, I was recommended to try naphthaline, and so far as I am at present able to perceive, no further destruction has taken place since I used the same. I put the naphthaline in a small pill-box with a perforated lid, which is glued into the corner of the drawer, and does not attract attention. Any insect specially affected should be removed from the cabinet or store-box and carefully painted on the thorax with corrosive sublimate.—*A. J. R.*

DESTROYING MITES ON LEPIDOPTERA.—In answer to "A. F.'s" query on this point, let me draw his attention to the following extract from Mr. Newman's preface to his splendid work on British Butterflies and Moths:—"Directly you observe any dust, however little, underneath an insect, ... take out the infected individual; as soon as he is removed from the drawer, drop benzole on his back, drop after drop, until he is thoroughly saturated, and all his wings are rendered perfectly transparent. In this state remove him to the drying-cage, and there let him remain until all the benzole has evaporated, and his colours have returned, bright and beautiful as ever." I have not tried this method myself, but I have friends who have, and they find it to answer perfectly.—*W. J. B.*

THE "FURNITURE" BEETLE.—Having just been put to much expense by repairs to furniture and skirting-boards, &c., which have been injured more or less by the furniture beetle, I should be glad to elicit any remarks upon its probable cure or prevention. I have generally found it in the sappy part of the wood, and have found it in every kind of wood used in house-building and furniture, except in mahogany; and I cannot hear of its being ever found in pitch pine. I am not sure of the correctness of my supposition, but I think that the beetle (it is not larger than a middle-sized pin's head) bores and lays its egg or eggs, and the grub eats till its changing period, the beetle from which then eats its way out; the holes not being larger in bore than a middle-sized pin. I have just been taking out several pieces of wood in my house, but could not detect the insect itself in any stage of existence. I have only twice seen the beetle, and can recollect the time was summer or autumn. On my own premises I have also found it out of doors, in old wood laid aside two or three years for burning. I hope to have some remedy discovered that may protect the new wood now replacing my damaged furniture and shelves.—*J. Hughes.*

MISTLETOE.—In reading the short notes on this species in the December SCIENCE-GOSSIP, I remembered seeing many large specimens some few years ago when engaged as a botanical collector in Normandy, that would with ease have been sufficiently long in the stem to have made a "small javelin." At the time, I took particular notice, but I do not believe I saw a single example on the Oak; the finest specimens were observed on the Lombardy Poplar. It is very abundant in the north of France. —*R.*

MISTLETOE ON LIME-TREES.—I do not think that this is an unusual phenomenon. Next to the Apple, the Hawthorn, and the Black Poplar, I should say that the Lime was the most frequent host of the Mistletoe. I have never seen the mistletoe growing in greater luxuriance than on two fine avenues of limes at Cutteridge House, near Westbury, Wilts. Near Malvern, where the mistletoe is abundant, I have seen it growing on a variety of other trees, as the Oak, the Maple, the Willow, and *Robinia Pseudacacia.—H. F. Parsons.*

SEEDS OF MISTLETOE.—Some twenty-two years ago I put two seeds of Mistletoe in a cavity formed on the stem of a young apple-tree, caused by the partial healing over of the part where a small branch had been cut off the previous season, tying a string of bass over to prevent birds, &c. from picking out and devouring them. They both took, and in three years had grown to about three inches in length; since then they have grown to about two and half feet through, but during the time have only produced three berries: that was two years ago. Since then one of the plants has died. It first showed symptoms of decay by the leaves becoming yellow and dropping off; since then it has fallen away piecemeal by breakage at the joints, the larger portions still remaining attached. The other plant, although so close, remains in perfect health and looks as usual, except that it is much thinner from the loss of the intermixed branches of the former plant. I cannot say which of the plants is dead,—either that which bore the berries or otherwise, but the remaining plant has no berries this season. Until the berries were produced, I had a notion that the plants were of one sex, consequently barren, but had always neglected examining them to ascertain the fact, which I now regret, as I fancy the berries produced were barren;—at least, none of them grew when inserted in the usual way. My plants, at first, were of very slow growth: the first season only produced two small stumpy leaves from each seed; the second, four on each, and so on; and I rather think only one joint in length has been produced of a season, but as the plant got stronger, frequently four shoots were produced instead of two, increasing thereby much faster, as well as forming a handsomer and much stronger-looking plant. Some years ago, I was much pleased and interested by observing, about an inch above the plant, several young plants which had pushed their way through the bark, which they have since continued to do, always ascending, and about an inch from each other, some of which are now dead and some living; from which I draw the conclusion that those produced from the former plant are dead also. These off-sets were of equally slow growth as the young seedlings, only a pair of leaves of a season, although more elongate, and I cannot understand H. E. Wilkinson's statement when he says he observed a protuberance and very soon a leaf,—mine always came in twos—and presently a good-sized plant of Mistletoe. Mine always take four or five years to come to anything like a good-sized plant, and I have grown many since the first, both on apple and pear-trees. The "Dumelow Seedling" is the apple on which my large plant is now. It was removed once when the Mistletoe was about five years old: it made not the slightest difference to its growth; but I have lost plants by removing the tree when only of the first year's growth. I also lost a fine young plant of four years' growth by the dying off of the tree itself by canker of the root, the Mistletoe living some months after the tree died, but losing colour and becoming rigid, and finally perishing also. My trees do not suffer in the least from the growth of the parasite on it, either in growth or bearing, although established on the main stem about three feet from the ground.—*Wm. Curnow.*

HOW TO PRESERVE ANIMALCULÆ.—I have several works on the microscope, but I have never read of any way to preserve animalculæ; that is, the best medium to use. I have tried several, but none have acted satisfactorily; viz., spirits, glycerine, glycerine and camphor: the last was the best. I mounted some *Canthocamptus minutus* and some *Chydorus sphæricus* in it, and found the objects looked better than when preserved in the other mediums, but still they were not to my satisfaction. Could you, or some of your correspondents, tell me of some better medium, I should be greatly obliged.—11, *Foley-street, Portland-place.*

ROOT-PROPAGATION OF THE IPECACUANHA.—In a paper on root-propagation read by Mr. Lindsay, of the Edinburgh Botanic Garden, before the Scottish Horticultural Association, that gentleman stated a curious fact in connection with the propagation of the Ipecacuanha by that operation—viz., from a piece of the root about a foot long or only one of the rings of the annulated root, one plant would be the consequence. Have any of the readers of SCIENCE-GOSSIP had any experience of the multiplication of that highly serviceable plant in that way?—*M. King.*

BADLY-BLOWN EGGS.—If any of the able correspondents to your journal could tell me of some fluid that would dissolve the hard albumen in badly-blown eggs without affecting the shell, I should be much obliged. I have had some rare eggs given to me that I wish to preserve, many of which are so badly blown that they have broken with very careful handling.—*G. T. B.*

PRESERVING ANIMALS.—I have just seen an article mentioning a method of preparing insects, fish, &c., for the cabinet, said to have been practised many years by Mr. Waterton, of Walton Hall. It is stated that the specimens are perfectly life-like, and not liable to damage by moth, mite, mould, or grease. I should be much obliged to any reader of SCIENCE-GOSSIP who would give me a few details of the process, or refer me to some work containing the necessary information.—*W. G.*

STORMY PETREL.—Dr. Keegan, in his article in the September number of SCIENCE-GOSSIP, states that this bird is only found in the wake of vessels during stormy weather. He then goes on to give a very ingenious theory to account for this, or rather to account for their following ships at all. In the North and South Atlantic, where the trade winds prevail and storms seldom or never occur, Mother Cary's chickens are constantly seen, and frequently near the equator, where possibly there is not a ripple on the water at the time. I think it is hardly necessary, when accounting for these or other birds following vessels, to bring forward a theory of their supposed love of the beautiful. The fact is, they know by experience that substances—to them very great delicacies—are continually thrown overboard, and they will as readily follow a hideous collier as a magnificent full-rigged ship. On the Thames, the Herring Gulls have the good sense to prefer fishing-boats, however old and dirty, to the smartest yacht on the river, well aware that from the former they will obtain the larger amount of food.—*J. S. G.*

THE VETERAN EEL.—I think that this subject will be one of interest, not only to "E. L.," but also to many aquarium-keepers, particularly so when we read of the death of an eel at the age of twenty-two years. I for one should be glad to know from Mr. Plant its size when he first had it, and at its death. Two years ago I had an eel which has grown three quarters of an inch in my keeping, and is now nearly four inches long. If this be the proportional rate of growth, we shall easily see to what length it will have attained in twenty-two years. I find that the best material to feed eels upon is the common blood-worm, which ought to be well washed before being put into the aquarium; otherwise some of the mud in which they live will be thrown into the tank.—*J. J. Newton.*

CEMENT FOR MARINE AQUARIA.—I can fully endorse the opinion of Mr. Worster as to the value of pitch as an aquarium cement, especially when used in the manner which I shall presently describe. A year and a half ago I rendered perfectly water-tight an eight-gallon tank which had been for years thrown aside as useless, and it has not leaked a drop since. This last spring I built another, holding about eighteen gallons, with an inch slate bottom, to which are screwed through holes drilled in the slate, the two ends of Spanish mahogany, well clamped to prevent warping, and lined with stout roofing slates cut to exact size. Into the mahogany ends the front and back of plate glass are grooved, and the whole finished with a strong mahogany capping rail all round, which also serves the purpose of tying the two ends well together. The glass is of course set in red-lead putty, and after giving the latter time to harden, I coated all the joints, the inner faces of two wooden rails into which the bottom of the plate glass was set, and in fact, every part which was likely to leak, with a mixture of pitch and gutta-percha (about quarter part of the latter). This mixture was laid on pretty thick with a putty-knife when just hot enough to stick. I then cut strips of sheet glass of suitable widths, and from two to four inches long, heated them over a small gas stove, and pressed them while hot into the pitch: of course, a pair of *hot* pliers must be used to handle the glass with, or it will fly. This plan I have found to answer admirably; it prevents the pitch from chipping or flaking off, and the best of it is, a tank so treated is ready for use immediately, as there is no effluvia of red-lead to be got rid of, every particle of poisonous cement being covered up with pitch and glass. This tank has now been stocked about four months, and is in every respect satisfactory. I may mention that one or two of my friends and myself have long been in the habit of using for rock-work a calcareous tufa found in this neighbourhood. It can be obtained in good-sized pieces, forms a good nidus for conferva, and is easily worked out into caves and hollows suitable for aquarium animals to shelter in, whilst at same time hard enough for the purpose. It also has the advantage from its porous nature, of holding a good deal of water, so that the space it occupies is not all lost. —*Edward Horsnaill, Dover.*

AQUARIUMS.—Why should sticklebacks fight so in aquariums, as "S" says, unless they cannot get food properly; for they live in shoals: at least, we find numbers together, though at times they seem very jealous of one another, and do not like intruders into their peculiar domain?—*Edward Thomas Scott.*

SLUGS AND FOXGLOVES.—With reference to Mr. J. W. Slater's observations respecting slugs and snails feasting heartily on the leaves of the Foxglove, I can testify to my fowls doing the same thing with impunity—without any bad result to those who subsequently eat their eggs.—*G. F. Cooke.*

UNUSUAL APPEARANCE OF THE MARTIN.—This week (December 4) this bird is busily flying about the summit of Overton Hill, Cheshire: it selects a sheltered wooden shed every evening for its roosting-place. It must have been a late-hatched bird, and thus left behind when its friends migrated. My little boy, who takes a deep interest in ornithology, states he believes it has been injured, and, therefore, not able to undertake the wearisome journey to a warmer climate. Mr. G. White would probably have made much of this fact in his day.—*R.*

WHITE HAIRBELLS.—On October 31st, I gathered several beautiful albino specimens of the common hairbell (*Campanula rotundifolia*), by the side of the Upper Shaftesbury road, about a mile and a half from this town. I gathered several on the same spot in October last year. It is noticeable that although not the slightest trace of colour was discernible in the flowers, yet, upon being dried, they assumed a bluish tinge. The ordinary pigment was therefore not quite absent, but was only precipitated in the process of pressing. Is not *hair*bell, as above, the correct name for this graceful little flower, on account of its fine hair-like stem, and not *hare*bell, which is quite unmeaning?—*W. R. Tate, Blandford.*

BOURNEMOUTH INSECTS.—With reference to Mr. Groser's remarks (p. 256, November number) upon the larvæ of *E. jacobeæ*, I may mention that I have seen them here regularly year after year on the Ragwort, but have often observed that they occur in patches; *i.e.* one patch of ragwort will swarm with them, while the next will have none. I infer that this is due to the sluggish flight of the insect. Bournemouth possesses an excellent list of local lepidoptera: I may instance, *N. viridata*, *E. cribrum*, *H. dipsaceus*, *B. trifolii*, *L. littoralis*, and others.—*E. B. Kemp-Welch.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers. — As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

Science Gossip Botanical Exchange Club.—In our last number we prematurely stated that all the parcels had been made up and sent out in connection with the above club. The majority of them have been delivered, but there still remain others, which will be forwarded as soon as possible. The work of arrangement and exchange has been enormous, and we must beg those members who have not yet received parcels to entertain a little patience. We feel certain that the result will satisfy all parties.

J. Bramhall.—It is not at all meditated to bring out a second edition of Blackwall's "Spiders" at present. We are not aware whether Messrs. Douglas & Scott have yet published their monograph on British *Homoptera*.

S. T.—Get the "Collector's Handy Book," price 2s. 6d., published by Hardwicke & Bogue, 192, Piccadilly. You will there find full instructions as to mounting microscopic objects. The best way of preserving animal bones is to steep them in gelatine, or boil them in a solution of glue.

F. H. L.—The "coral-like substance" you sent us from Falmouth beach is not a coral but a lime-secreting sea-weed, called by Harvey *Melobesia fasciculata*. It is allied to the common *Corallina officinalis*.

E. Edwards.—Many thanks for your good wishes. You had best procure Robson's book of "Botanical Labels" from Messrs. Hardwicke & Bogue, and paste each label on the species.

W. K. (Leeds).—We know of no better way of hermetically sealing specimens in bottles containing spirits than the old-fashioned one of covering the outside of the cork with a layer of melted sealing-wax.

K. A. Deakin. — The Palæontographical Society have published the fossils of nearly every British formation, and these are contained in about thirty large volumes. By applying to the secretary, Rev. T. Wiltshire, Lewisham, we have no doubt you could obtain a list of all the society's publications. You can get the implements you speak of at any large natural-history dealer's.

J. H. Morton.—There is no possible danger of being bitten by the slowworm (*Anguis fragilis*).

S. T. — For stocking small aquaria see instructions contained in "The Aquarium, its Structure and Management," published by Hardwicke & Bogue, 192, Piccadilly.

J. D. O.—Get S. Wood's shilling book on "The British Bird Preserver," published by Warne & Co.

A. Michael.—Your desmid is *Closterium setaceum* (in conjugation).

J. R. James.—Many thanks for your kindly suggestions, they will not be unheeded.

EXCHANGES.

Dr. Morton, New Brompton, Kent, would like to have a botanical correspondent in Southampton or neighbourhood.

For well-mounted slides or good material the following objects, unmounted :—Barbadoes *Polycystina*, sponge sand, nfusorial earth, cleaned guano, leaves of *Deutzia scabra* mounted and unmounted; mounted slides of *Polycystina, Foraminifera*, flies' tongues (good), diatoms from Yarra Yarra, New Nottingham, Mediterranean, &c., *Arachnoidiscus, Isthmia*, Salicine, double sulphate magnesia and copper, selenite films, eel's skin, parasites various, polyzoa, and others.—William J. Fuller, Broad Plain Soap-works, Bristol.

Herbert Wheldon, South Parade, Northallerton, Yorks, will send post-free fifty foreign stamps, all different, on receipt of eggs of Sparrow or Kestrel Hawk, or any of the Raptores.

Sections of Thyroid Gland and Scirrhous Cancer, stained, ready for mounting, in exchange for Slides (Diatoms preferred).—T. V. D., 33, Sloane-street, London.

Slides of fresh-water Algæ and Fungi for others of same class or Physiological. Send lists to Dr. Parsons, Goole.

Fifteen bottles, each containing from twelve to sixty sections of British and Foreign Woods, in exchange for deep sea soundings (cleaned) or other good objects.—H. L., 6, Upper Phillimore-gardens, Kensington, London, W.

Wanted, British and American Fossil Diatomaceæ, Earth of Dolgelly, South Mourne, Loch Boa, Bermuda, Richmond, Nottingham, Guano Ichaboe, &c., for good slides, fossils, Swiss Diatoms, Oran, Santa Fiora, Franzcusbad, &c., or cash.—Eug. Mauler, Travero, Switzerland.

For river mud from Lagos send some object of interest or good material for microscope.—A. Smith, 198, Essex-road, Islington.

Wanted, living specimens of *Hydra fusca*; will exchange for unmounted *Sertularia abietina*. — Henry Leipner, 47, Hampton Park, Cotham, Bristol.

Good specimens of Moths in exchange for good microscopic objects: *Populi, Ligustri, Elpenor, Bidentata, Roborardi, Papilionaria, Taminata, Flarago, Persicariæ, Pembica, Croceago, Pyramidea*, and many other specimens.—J. Mighall, 2, High-street, Lindfield, Sussex.

Lardner's "Museum of Science and Art," 12 vols., in good condition, in exchange for any good works on the microscope.—W. Wilson, 4, Caledonian-place, Edinburgh, N.B.

A Number of Dragon-flies, &c., from the North of Ireland and Diptera, Lancashire, may be had by sending box and return postage to F. Curtis, 32, Woodfield-terrace, Fernhill, Bury, Lancashire.

For piece of Cuticle of Aloe send stamped envelope to E. B. L. Brayley, 2, Burlington-buildings, Bristol.

For Birds' Eggs or *Lepidoptera* can offer Sponges from the White Chalk, and other fossils from the Red Chalk, small size, suitable for a cabinet.—M. Lawson, High-street, Bridlington.

Wanted, mounted or unmounted Diatoms of every variety in exchange for mounted micro objects.—Atkins, Chemist, 200, Essex-road, Islington, N.

Wanted, microscopical slides in exchange for British flowering plants and ferns (many rare).—T. Watson, Bank Parade, Burnley.

For *Foraminifera* and Red Spicules from West Indian Sponge please send slides or unmounted material (good) to E. W. Burgess, 35, Langham-street, London, W.

Wanted in quantity, good typical *Gneiss, Amygdaloid* and *Porphyries*. Good exchange given in Fossils, Shells, or Minerals.—Thos. D. Russell, 48, Essex-street, Strand, W.C.

Would the gentleman who sent me three slides for sounding please to let me know his address, as I lost his letter?—A. Alletsee, 11, Foley-street, London, W.

For specimen of *Sertularia abietina* send stamped envelope and object of interest to Chas. Williams, Kingmeade, Woolcott Park, Redland, Bristol.

Foreign or British shells offered for living specimens of the Diving Spider *Argyroneta aquatica*.—Tom Workman, Belfast.

Duplicates.—*Edusa, Cardui, Galathea, Cassiope, Tanira, Pamphilus, Agestis, Adonis, Chrysorrhœa, Sambucata, Petraria, Piniaria, Gilvaria, Impura, Chi*, &c. *Desiderata:* Lepidoptera.—A. H. Shepherd, 48, Roden-street, Holloway, N.

Offers in birds' eggs for a stamp album containing 332 stamps of various countries, including Egypt, America, Spain, Russia, Greece, &c.—J. Wheldon, care of Miss Appleton, Market-place, Darlington.

Wanted, Science-Gossip for 1870, '71, '72, '73, and '74, either bound or unbound; microscopic slides, &c., given in exchange.—W. A. Hyslop, 22, Palmerston-place, Edinburgh.

BOOKS, &c., RECEIVED.

"Physiography." By Prof. Huxley. London: Macmillan.

"A Lecture on Winds, Ocean-Currents, and Tides." By W. Leighton Jordan. London: Hardwicke & Bogue.

"Geological and Geographical Survey of Colorado." By Prof. Hayden.

"Ethnography and Philology of the Hidassa Indians." By Washington Matthews.

"Fur-bearing Animals, a Monograph of the North American Mustelidæ." By Dr. Elliott Coues. Government Printing Office, Washington, U.S.A.

"Industrial Art." December.

"Journal of Applied Sciences." December.

"Botanische Zeitung." November.

"Land and Water." December.

"American Naturalist." November.

"Time's Footsteps; A Birthday Book of Bitter-sweet." London: Hardwicke & Bogue.

Last No. of "Monthly Microscopical Journal."

"The Naturalist." December.

&c. &c. &c.

Communications have been received up to the 10th ult., from:—T. S.—W. W. S.—D. B.—W. J. S.—K. A. D.—H. W. S.—T. B.—J. H. M.—J. M. H.—Dr. M.—T. B.—W. H. S.—R. G.—H. G.—S. T.—W. H. S.—V. C.—T. L.—W. P.—H. W.—G. C.—F. C. K.—W. M. G. W.—R. J. W.—J. W. G.—W. H. M.—J. J. W. S.—W. G.—T. V. D.—F. H. L.—G. C. D.—H. L.—E. M.—Dr. H. F. P.—J. S. G.—A. S.—W. H. W.—T. R. M.—H. A. B. L.—J. B.—M. J. W.—H. M. J. M.—E. T. S.—J. H. R.—W. W.—E. E.—G. C. M.—J. B.—S. S. B.—M. L.—W. K.—J. C. J.—F. C.—J. C.—G. C. D.—E. B. L. B.—Prof. G. S. B.—W. E. G.—W. C.—W. A. H.—A. J. R.—L. W. G.—T. T. R.—J. D. O.—G. P.—J. D.—J. T.—W. H. S.—M. S.—W. H. L.—A. A.—C. F. W. T. W.—J. H.—T. W.—A. H. S.—E. F. C.—J. W.—W. J. B.—W. J. B.—E. W. B.—W. W.—T. W.—A. M.—A. S.—D. S.—W. S. W.—J. A., Jun.—J. H. K.—J. C. M.—A. R.—T. R. J.—P. M. D.—D. D.—&c. &c.

THE PRONUNCIATION OF SCIENTIFIC NAMES.

By RANDAL H. ALCOCK, F.L.S.

IT is a source of satisfaction, I should imagine, to all authors, when they find that their works are read; and I feel flattered that Mr. Newlyn should quote from my work, "Botanical Names for English Readers," especially as, in the half-dozen pages I wrote on the pronunciation of scientific names, I aimed only at giving a few plain, though to the best of my knowledge correct, hints on the subject to those who might wish for them; but by no means at assuming the position of a teacher of this matter to those who, by their knowledge of Greek and Latin, are competent to form a judgment of their own. But Mr. Newlyn, in his article on the pronunciation of scientific names (No. 153, p. 193), has misunderstood my meaning. He says: "Mr. Randal Alcock points out, in a rule, that in words direct from the Greek, *especially modern scientific terms*, the *g* is pronounced hard"; and remarks, "Really, this is implying that the older terms may go their own way as regards our dealing with this letter in any of them, and the young student in botany must be utterly puzzled in his attempts at utterance of scientific language." Perhaps these words of mine, thus separated from their context, may seem to imply what is stated, but not otherwise. The sentence immediately preceding the one quoted is: "Those Greek words that come to us through the Latin, and have been long in use with us, generally follow English usage, and are pronounced soft, though not always; for instance, both *gymnastic* and *jymnastic* may be heard." In an earlier part of the same chapter, I endeavoured to show how much pronunciation must depend upon usage, and how futile it is to lay down hard-and-fast rules to meet every case. I have, therefore, not left it to be inferred that any class of terms "may go their own way," but I have said the rules must be modified by usage.

Mr. Newlyn disagrees with my view that the *g* in scientific names from the Greek should be pronounced uniformly hard, as in Geum and Potamogeton; indeed, he asserts that it should not be in these cases, though he allows that authorities differ. I entirely agree with Mr. Boulger (No. 152, p. 191), when he says that "a scientific name is a Latin and not an English word, and must be pronounced, if not spelt, accordingly." This being so, the only question is how to pronounce Latin, a question which cannot at present be answered decidedly, as both the traditional English pronunciation and the new pronunciation are being taught. Which will ultimately prevail remains to be seen; but if the new pronunciation become universal, there will no longer be any difficulty, or ambiguity, regarding such names as have been written about in your journal. Mr. T. D. Hall, M.A., in "A Child's First Latin Book," which aims at leading "step by step to the acquirement of the pronunciation of Latin, as set forth by the professors of Latin at Cambridge and Oxford," says, "*c* has always the sound of *k*: as Cĭcĕro, pronounced Kikero; Cæsar, Kaysar; cīvis, keevis; scĭlĭcĕt, skeeliket; scĭo, skĭo. *g* is always sounded hard, as in go, gun: as gĕnŭs, gigno, rēgīna." We do not meet here with the pronunciation of *ch*, but in Dr. Smith's "Principia Latina, Part I.," we find, "Latin *c*, *ch* = English *k*." This would give us, or the "utterly puzzled" young student, without any doubt, Rikardsonia as the pronunciation of Richardsonia; Rikardia of Richardia, Lakenalia of Lachenalia; Fūksia of Fuchsia; Geranium, Potamogeton, Geum, with *g* like g in gun.

I am very much in favour of the new pronunciation myself for many reasons, which it is not necessary to enter upon. I merely say that it has been arrived at by competent authorities, and is now very extensively taught. "The usage of our universities" is rather a vague expression, as they do not all agree; and so long as we have English teachers who have studied abroad, and distinguished foreign savans visiting us

here, there must always be a certain amount of latitude allowed, if we retain the English method of pronouncing Latin. We may say Fewschia or Jeranium to an Englishman, but who would do so to a German?

I cannot see, then, that the pronunciation of many of the names can at present be reduced to strict rules, which any one would feel bound by; scirpus is pronounced sirpus, according to the old style; skirpus according to the new, &c.; but in the case of quantities, I think absolute uniformity might be arrived at, which is not the case at present. If I were to ask, what are the correct accentuations of Conium, Cyperus, Populus, for instance, I should not expect to receive uniform replies.

As to the euphony of the names, those who have to apply them are responsible, and they are supposed to have sufficient knowledge of plants, and the system of nomenclature, to give correct names: much of what remains depends upon taste. "It is certain no one ought to name a plant, if he is not a botanist; nor is any one at liberty to impose a generic name who does not understand genera; on the other hand, we have no doubt that any one who knows that a plant is perfectly distinct generically from all others, also knows how to apply a distinct name" (Linn. "Crit. Bot.," § 218). It is true that names are not always everything that might be desired, nor have they always been correct; but if correct, they should not afterwards be altered. Euphony does not entirely depend upon the taste of the plant-namer, for often he has little choice. Thus, as Jacquin wished to do honour to Patrick Browne, and named Brownea after him; Smith, when he wished to honour Robert Brown in the same way, had to invent a fresh form, and therefore named his genus Brunonia; Linné having already used Brunia in honour of Lebrun.

Mr. Newlyn is scarcely correct in saying that Brownea and Brunonia are "etymologically identical," for, not only are they derived from the names of different people, but also, in the first case, the name was spelt Browne and in the second Brown. Hence Brown*ea*—Théis has it Brownaeā—not Brown*ia*, which it would have been but for the final *e*. It is well these minutiæ should be noticed, else "both the complimentary importance and the etymological form might be sacrificed."

I have not hitherto felt inclined to take any part in this controversy, because, if common usage be taken into account, no decisive answers can be given to the questions asked. Thus "E. C." (No. 151, p. 164) argues that the *ch* in Lachenalia should have the sound *sh*, because it was "named after M. de la Chenal." De Théis says it was named after Werner Lachenal, professor of botany at Bâle. Whether he was a pure Frenchman, or a pure German, or a German of French extraction, I do not know; but if he were the latter, as his Christian name, and changed surname, would seem to indicate, there is still no certainty how he pronounced his own name, for the Germans themselves do not pronounce *ch* in a uniform manner; some would pronounce it *k*, some *ch*, as in the Scotch loch, some *sh*; and there are also intermediate sounds between these to be met with. According then to "E. C.'s" idea, he may call Lachenalia what he chooses without being incorrect; but certainly Mr. Boulger's view that it should be pronounced as though it were spelt with a *k*, because it is a Latin word, seems more reasonable. We cannot follow the pronunciation of all languages in commemorative names, but must take them as Latin, and pronounce them accordingly. Magnol pronounced in French, does not correspond with Mag-nó-lia pronounced in Latin.

I repeat, in conclusion, my opinion that when we have a uniform pronunciation of Latin, we may have a uniform pronunciation of botanical names, but not until then. In the mean time, as Mr. Newlyn says, "the pronunciation of botanical names is but of secondary importance," and I have taken my pen up now, only because Mr. Newlyn has misunderstood what I have previously published on this subject, and, unintentionally no doubt, misrepresented my meaning. This is the general teaching of my book, with regard to the pronunciation of the letter *g*, in botanical names. In names direct from the Greek, it should be pronounced hard; *e.g.*, Geophlia, Georchis, Geropogon. But if the student always hears the *g*, in such words as Genista, Gentiana, Geranium, in the British Flora pronounced soft, let him pronounce it soft, though Geranium is a Greek name of Dioscorides; or, if he sees, judging by analogy, that according to English usage, such names as Gerardia, Geoffroya, Gilia, would be pronounced soft; let him follow that usage. I would add, that if he should be in doubt about such names as Gireondia, Gesnera, Genipa, Giukgo, let him pronounce the *g* hard. I hope it may be pronounced so before long in every case.

THE SEALS AND WHALES OF THE BRITISH SEAS.

By Thomas Southwell, F.Z.S., &c.

The Sperm Whale (*continued*).

No. VII.

THE pursuit of the Sperm Whale is attended with much greater danger than that of the Greenland Whale, and Beale gives many instances in which, in his own experience, boats were stove in and men lost; stories of fighting whales, he says, are numerous, and probably much exaggerated; one, known as "Timor Jack," is said to have destroyed every boat sent against him, till at last he was killed by being attacked from several directions at the same time, thus diverting his attention from the boat which made the successful attack. Another fish, known as "New Zealand Tom," destroyed nine boats successively

before breakfast, and when eventually captured, after destroying many other boats, many harpoons from the various ships which had attacked him were found sticking in his body. There is one well-authenticated instance of a vessel being attacked and destroyed by a sperm whale: the American whale-ship *Essex* was attacked by one, which, first passing under the vessel, probably by accident, came in contact with her keel and carried it away; then turning and rushing furiously upon the ship, the whale stove in her bow; so serious was the breach that the vessel speedily filled and went down. Most of the crew were away in their boats at the time, but those on board had just time to launch their one remaining boat before the vessel sank. The boats made for the coast of Peru, the nearest land, many hundreds of miles distant; one of them was picked up drifting at sea, and three of the crew, who were found in it in a state of insensibility, were the only survivors of the ill-fated vessel.

In addition to the sperm and oil, this species yields another product which is, or was, very valuable, although it is the result of disease, and one would imagine a very uninviting substance—I refer to *Ambergris*, the origin and composition of which was so long a puzzle to the learned. This substance is now well known to be a concretion of the indigestible portions of the Cuttle-fish, which form the food of the Sperm Whale. The nucleus of the mass is generally the horny beaks of these creatures, and the substance itself is found in the intestines of the Sperm Whale, or on the shores of the seas frequented by this species: no other whale is known to be subject to these bezoars. It was formerly believed that the origin of ambergris was in some way connected with the sea, and when it was afterwards found in whales, the fact was simply attributed to their having swallowed it. Sir Thomas Browne writes of the Sperm Whale which came on shore at Wells, in 1646:—"In vain was it to rake for ambergriese in the paunch of this leviathan, as Greenland discoverers and attests of experience dictate that they sometimes swallow great lumps thereof in the sea; insufferable fœtor denying that inquiry; and yet if, as Paracelsus encourageth, ordure makes the best musk, and from the most fœtid substances may be drawn the most odoriferous essences; all that had not Vespasian's nose (*Cui odor lucri ex re qualibet*) might boldly swear here was a subject fit for such extractions" (p. 356, vol. i.). It was not until 1783, in a paper read before the Royal Society by Dr. Swediaur, that a scientific account of the origin of ambergris was made known. At the present time its medical virtues, which were formerly considered very great, are altogether at a discount, and the only use to which it is applied is in the preparation of perfumery.

I have said very little about the method of pursuit and capture of this species and of the Right-whale, because it is a subject in which I take no pleasure; those who wish to know how these peaceful and highly-organized giants are approached, and how they behave when terrified and smarting under the harpoon and whale-lance, can pursue the subject *ad nauseam* in the pages of Scoresby, Beale, and others; the sickening process of "flensing" and disposing of the blubber is described with equal minuteness. I for one cannot appreciate the halo of romance with which some authors seek to surround the whale-fishery. Doubtless the occupation is one of hardship and danger, but the remuneration when successful is in proportion, and I can hardly conceive of men inflicting the fearful amount of suffering which every "full" whaleship, or in a still greater degree every "full" sealer, represents,—under any circumstances. Science is constantly adding to our resources, and it is sincerely to be hoped that ere long substitutes may be found for animal oil and whalebone which will supersede their use in the few processes in which they are still requisite: should this be long delayed, it is to be feared that the seals and whales, at least of the northern seas, will soon cease to exist.

Although so widely spread over the waters of the globe, possessing, I believe, a range greater than any other known species of animal, it is only open and deep waters which can be said to be the home of the Sperm Whale; and when found in shallow seas, its generally emaciated condition indicates the absence of its proper nourishment; and the readiness with which whole herds precipitate themselves stupidly upon the sands, shows how little they are acquainted with such objects. Mr. Andrew Murray makes some observations upon this subject, which are so interesting and so suggestive that I must ask you to excuse my making a long quotation.

Speaking of those specimens which have now and then been cast ashore in the North Atlantic or in the English seas, he says: "They seem to be unprepared for, or not adapted for, shallow seas. Accustomed (perhaps not individually but by hereditary practice or instinct) to swim along the coral islands of the Pacific within a stone's throw from the shore, they cannot understand, their instinct is not prepared to meet, shallow coasts and projecting headlands. If they were habitual residents in our seas, they must either be speedily extirpated, learn more caution, or be developed into a new species." . . . . Mr. Murray further says: "I observe that almost every place that has been above mentioned as a favourite resort of the Sperm Whales, although not out of soundings, has claims to be considered the site of submerged land. The islands of the Polynesia, which are its special feeding-ground, are the beacons left by the submerged Pacific continent. In pure deep seas animal life is usually scarce, and the absence of breeding-ground is probably the chief cause of it; but this only applies to a certain kind of animals, those which require a bottom on which to

deposit their spawn; but there are many which do not require this. The spawn of some floats about unattached; for others a frond of weed is sufficient attachment; and it has occurred to me that the distribution of the Sperm Whale may in some way be connected with the geological antecedents of the ocean it inhabits. I think it not improbable that the

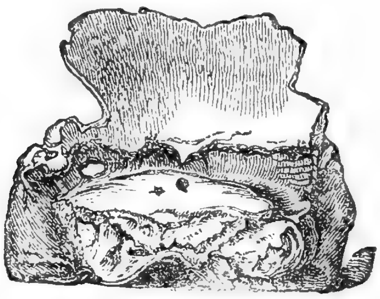

Fig. 12. Chair in Great Yarmouth Church formed of the basal portion of the skull of a Sperm Whale (from Palmer's "Perlustration of Great Yarmouth").

site of a submerged land may swarm with life, which originally proceeded, or was dependent on it, long after it had been in the deep bosom of the ocean buried. The Sargasso seas, which swarm with *Eolidæ* and *Crustacea*, are examples of this life: it is not invariably either present or absent in deep water, and it is its presence or its absence which is instructive. Those animals which required a bottom to spawn upon may have died out or been developed into others which do not; and those which do not require such a support may have multiplied correspondingly. In one of the maps in Lieutenant Maury's book, already cited, there is a space of sea opposite the western coast of South

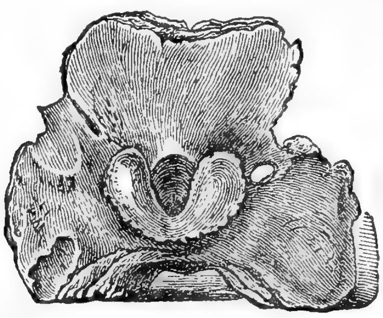

Fig. 13. Under surface of the Chair (from same work).

America, and lying between Patagonia and New Zealand, marked 'Desolate region, distinguished by the absence of animal or vegetable life';—no sperm whales here—nothing for them to feed upon—and no symptoms, either by banks of Sargasso or coral islets, of any land ever having existed there. There is no apparent reason why this place, except from some special cause peculiar to itself, should be more desolate than any other in the same latitude—than the deep sea on the east side of Patagonia, for example. I can imagine that, if the bottom of the sea should subside gradually, where animal life had once abounded, animal life—not that animal life, but animal life due in some way to it—might continue to linger over it long after it had passed beyond the depth at which it could practically have any effect upon the animal life above it; but if a part of the circumference of the globe has always been under water, before and ever since the creation of life, no life is likely to be found on that spot, because it has never had a starting-point of life from which to begin; and, as already said, a slender barrier stops the spread of species, and species would certainly not spread to a spot where there was nothing for them to feed upon. Again, animal life could not begin to feed upon animal life till vegetable life had previously prepared the way by providing food for the animals which were to furnish food for others; and vegetable life could not begin to grow without a foundation of land, accessible either above or below water. The total and constant absence of all life at any particular spot appears to me, therefore, to furnish a presumption that there has never been dry land or shallow water there. Whether the continuance of deep water in one spot for some

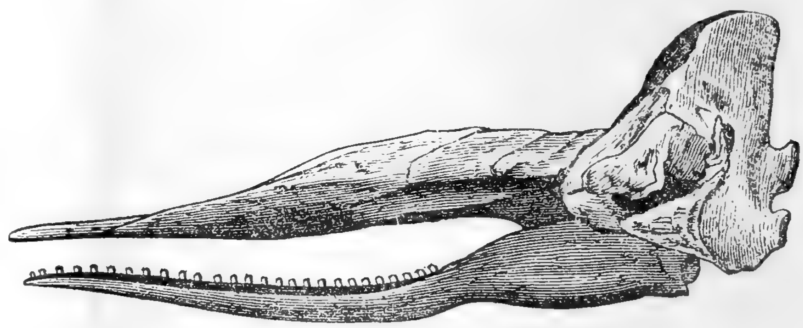

Fig. 14. Skull of Sperm Whale.

interminably long time might not have the same effect is another question, which, whatever way it may be answered, would not affect my explanation of the cause of the absence of the Sperm Whale from such spots."* I am indebted to the kindness of Chas. J. Palmer, Esq., of Great Yarmouth, for the woodcuts (figs. 12 and 13) representing the chair in Yarmouth Church which is formed of part of the skull of an individual of this species.

The sub-family *Ziphiinæ*, which follows next, is, perhaps, the most remarkable of the whole of this interesting order. The *Ziphioid* Whales, as they are designated, are, with one exception, very rare, and until the commencement of the present century, with that one exception, were known to science only from their numerous remains, found chiefly in the Crag deposits. "Since that time, however," says Prof. Flower, in his memoirs of this group (Trans. Zool. Soc., vol. viii. p. 203), "at irregular intervals, in various and most distant parts of the world, solitary individuals have been caught or stranded, now amounting to about thirty, which by some naturalists are referred to upwards of a dozen distinct species, and to very

* "Geographical Distribution of Mammalia," pp. 211–213.

nearly as many genera. No case is recorded of more than one of these animals having been observed in one place at a time, and their habits are almost absolutely unknown. . . . This comparative rarity at the present epoch," he farther says, "contrasts greatly with what once obtained on the earth, especially in the period of the deposition of the Crag formations, and leads to the belief that the existing Ziphioids are the survivors of an ancient family which once played a far more important part than now among the cetacean inhabitants of the ocean, but which have been gradually replaced by other forms, and are themselves probably destined ere long to share the fate of their once numerous allies or progenitors."

The members of the group may be distinguished at once by the absence of functional teeth in the upper jaw: those in the lower jaw are always quite rudimentary, with the exception of one, or occasionally, two pairs. These may be largely developed, especially in the male sex, and are placed, generally, well forward. The blow-hole is sub-crescentic, and a pair of remarkable furrows occur in the skin of the throat, almost in the form of the letter V, the point directed forward. The skull presents a remarkable appearance in the genus *Hyperoodon*, caused by the enormous maxillary crests which produce the peculiar conformation of the head in the living animal, originating the trivial name "Bottle-head." The common BEAKED WHALE, or BOTTLE-HEAD (*Hyperoodon rostratus*, Chemnitz), is of frequent occurrence in the North Atlantic, and generally visits our shores in autumn, sometimes ascending the estuaries of rivers: it has been taken several times at the entrance to the river Ouse. It is solitary in its habits, more than two are never met with in the same place, and in that case it is often the old female and her young one: the old male is said to be very shy and rarely secured. In September, 1877, an adult female, 24 ft. long, was taken in the Menai Straits; it was accompanied by another, probably its young one. The colour is black above, the under parts being lighter: the two teeth in the lower jaw are generally hidden in the gum. Its food consists of cuttle-fish, the remains of great numbers of which have been found in its stomach. Another species of *Hyperoodon*, *H. latifrons*, has occurred three or four times on the British coast; it has also been taken in Greenland. Very little is known about it as a species, and that only from its bones: it is supposed to attain a greater size than *H. rostratus*, probably upwards of 30 ft.

CUVIER'S WHALE (*Ziphius cavirostris*, Cuv.), another of this remarkable group, has been met with once on the coast of Shetland, and it, or its remains, have been found about five or six times in other parts of Europe, and also, it is believed, at the Cape of Good Hope, and the east coast of South America. It has two teeth, one on each side the lower jaw, close to the extremity. Cuvier established the genus *Ziphius* in 1825, from a fossil skull found on the coast of Provence, in 1804, which he believed at the time to belong to an extinct animal.

(*To be continued.*)

STRUCTURE OF SAND-HILLS.

By W. B. GROVE, B.A.

LAST summer I had a very good opportunity of examining the structure of the *dunes* on the Lancashire coast. A copy (fig. 15) of a sketch, made on the spot, may be interesting, as I can find none in our common text-books which give an accurate idea of it. It was taken from a natural section of a hill about 14 feet high, half of which had been neatly blown away by the wind. The irregularity of the bedding, represented by the darker lines, is due to

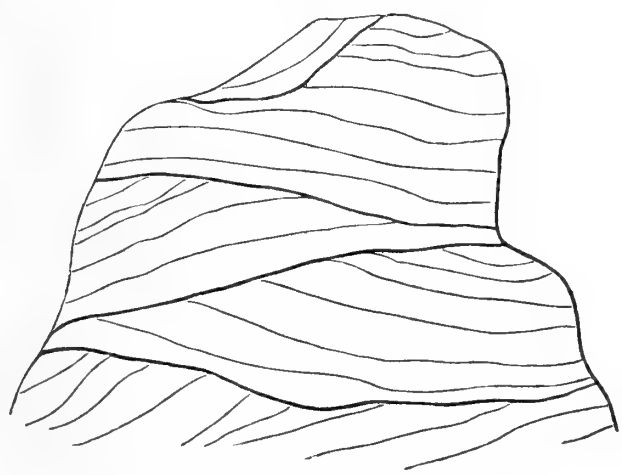

Fig. 15. Section of Sand-dune, Lancashire.

changes in the direction of the wind, which, after depositing a stratum, often sweeps away a part of it; and then, after another change, deposits fresh material on the new surface. As the successive laminæ conform accurately to the varying outline of

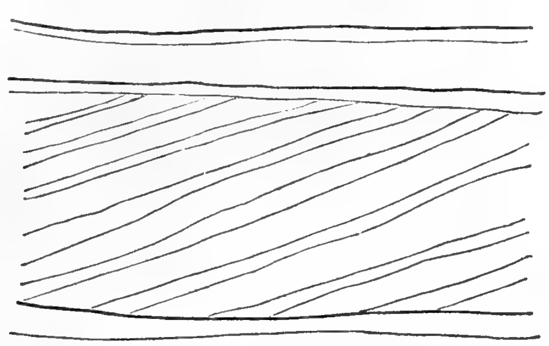

Fig. 16. Sandstone Cliff, Suffolk (after Lyell).

the surface on which they are deposited, a series of irregular beds is thus produced. This is often called *false-bedding*. The same name is also applied to *diagonal stratification*, in which the planes of the laminæ of sandstone are oblique to the plane of stratification, as seen in fig. 16. But this latter structure can only be formed, I believe, when a current of water, carrying coarse sediment, meets with a sudden

check to its velocity, and lets its burden fall; the particles then arrange themselves at the proper "slope of repose," which depends upon their size and form. This can seldom or never happen to a current of air on a large scale, and consequently diagonal stratification will rarely occur in sand-dunes.

My reason for repeating these well-known facts is that, in J. Geikie's small "Geology," I find the following passage:—"Sometimes the layers of deposition in a single stratum are inclined at various angles to themselves. This structure is called *false-bedding;* the laminæ not coinciding with the planes of stratification. . . . . Hillocks of drifting sand frequently show a similar structure, but their false-bedding is, as a rule, much more pronounced." The first two sentences of this passage contain slightly different ideas, and must confuse the student's mind. According to my observation, moreover, the statement in the last sentence is not true, if he takes the *latter* of the two definitions apparently given of false-bedding, as he would naturally do. It is best not to use the term *false-bedding* at all, but discard it, as is done by Lyell and Jukes, in favour of the two, *irregular bedding* and *diagonal stratification.* The latter of these cannot be called by the rejected name, as it is not the bedding but the lamination that is abnormal; we may, indeed, apply the name to the former, but we shall have to explain that *false* means *irregular* in this case, and we do not gain much, except the opportunity of writing a second sentence to explain the meaning of the previous one.

THE CLASSIFICATION OF THE FORAMINIFERA.

By W. K. Marriott.

THIS was the subject of a paper recently read before the Metropolitan Scientific Association. The author referred to the *Eozoon Canadense*, and while giving a brief recapitulation of the arguments in favour of its organic origin, he held it up as not only the first of all foraminiferous life, but also, in its special capacity as a rock builder, as typical as the very Globigerina itself. He considered as inimical to the claims of the Eozoon that Messrs. King and Rowney, the leaders of the opposition, had lately received a grant from the Endowment of Research Fund, for "Researches to determine the Structural, Chemical, and Mineralogical Character of a certain Group of Crystallic Rocks." If this were aimed at the Eozoon, he was content to leave the matter in their hands, feeling confident that its position in the animal world was assured. After referring to the utility of classification in general, he showed how the classification of the Foraminifera had been alternately neglected and over-indulged in; how in the one case it was left to itself, and in others had been filled with synonymes, and how M. D'Orbigny had rescued it, and how he again had spoiled it. He then showed the system of the classification of the whole Protozoic group, and how its two great branches, the Rhizopoda and Ciliata, develope on the one hand, through many stages, up to the many-chambered Foraminifera, and on the other to the Actinophrys and Vorticella. He regretted he could at present do no more than indicate the great question that lay open at this point, namely, how these two developments of Protozoic life are related to the supplementary groups of Polycystina, Thallassacollida, and Spongiada, and to the Ichthydina and Noctilucida. As the classification of the Foraminifera rests, by reason of the simplicity of its animal matter, upon no physiological basis, it remains very clearly that it can only be upon the structural difference of its shell; this, again, being due to the hardening, with only very slight modifications, of the outside of the creature—the calcifying of its epidermis, as it has been somewhat curiously called; this classification rests on very reasonable and simple grounds. The necessity of the first great divisions into Monothalamia and Polythalamia immediately suggests itself. The Monothalamia, or one-chambered Foraminifera, consists of three families. The first, and largest, in point of genera, is the *Lagynida*, so called from the flask-like shape of its members. Specimens were shown under the microscopes in the table, and were found to exhibit every variety of form of flask that ever left the hand of the potter. This distinctive feature was also shown upon the black-board; indeed, Mr. Marriott materially assisted his audience in understanding the principles of the classification by sketching thereon typical genera of all the families, giving the salient points in the structure of the shell by which the creature earned its name and position. The second family, *Orbulinida*, has but one member, but this is the interesting Orbulina that the *Challenger* Expedition has brought prominently to the front; its points of resemblance to the Globigerina were dwelt upon, and also its curious divergences from that genus. The third family, *Cornuspirida*, was then shown, and its great apparent resemblance to our fresh-water mollusk, the planorbis, at once fixed it on the mind; this concluding the *Monothalamia.* The grouping of the *Polythalamia* was next shown, but here a greater number of families are found, and consequently intricacies of various kinds to be encountered. The first group, the *Helicoidea*, contained every spiral-shaped Foraminifera there was, and some, like some of the members of the first family, that were not spiral at all, but simply possessing more chambers than one. These were the Miliolida, from their resemblance to millet seed. The second family, *Turbinida*, possessed, with many variations, a shell like the well-known mollusk *Turbo*, and specimens of this family are found in all collections. A sub-family of this, called, from its clustering and grape-

like form, the *Uvellida*, contains the world-famed Globigerina. And another well-known sub-family, the *Textilaria*, shows a curious conformation of a spiral that produces the appearance of being woven. Then comes the second great family of the Polythalamians, the *Nautiloidea*, that led M. D'Orbigny into the error of classing them with the Nautilus and Ammonite. A reference to specimens showed how far he was justified in this. The first subfamily, the *Cristellarida*, the second *Nonionida*, third *Peneroplida*, and fourth *Orbientina*, contain well-known genera that, either in outward form or inward structure of cell and segment closely mimic the form of that great class from which more recent investigation has banished them. The remaining two families were then enumerated, and the *Orbitulita*, as being the most interesting belonging to them, was detailed, after which the *Rhaboidea*, the second great group, or rod-shaped Foraminifera, was explained. This possesses but one family, the *Nodosarida*, whose knot-shaped chambers, arranged one on another, enables everybody at once to identify them. This brought the classification to an end. Mr. Marriott, in conclusion, passed on to the life history of one of the Foraminifera as typical of the whole of the class. He chose the Globigerina, because round it has centered the most popular and scientific interest and research, and gave the most recent investigations and speculations on the subject.

A VISIT TO SPONSA'S HEADQUARTERS.

By H. C. Dent.

After reading the two papers on "Lepidoptera of the New Forest" and "Sport in the New Forest," our hopes were roused, and we arranged to go to that Elysium in the long vacation. As my brother was not free till the first week in August, I filled up some of the spare time in visiting Darenth Wood, Box Hill, and Epping, in successful quest of the spring species; and at the end of June went for three weeks to Switzerland, and visited its glaciers, snow-peaks, and insect hunting-grounds. Here I must wander, and give a few localities for those who propose a trip to that glorious country next season. The upper end of the Lauterbrunnen valley, near Trachsellauenen (very good little inn) is a splendid place. Here, while revelling in the sight of the Jungfrau, Mönch, and many other superb peaks, you may take *Machaon*, *Arion*, *Hyale*, *Cratægi*, *Globulariæ*, *Trifolii*, *Loniceræ*, *Grammica*, two kinds of large copper, and many foreign species of blues and fritillaries; on the Chaumont near Neuchatel, *Apollo* and *Podalirius* abound (also the most atrocious and pertinacious *Diptera*); at Grindelwald I captured four superb Machaons at one fell swoop; the Nicolai Thal—and in fact the Zermatt district generally—with the vineyards above Saxon (Rhone Valley) well repay a visit; while at Gryon, near Bex, *Dia* and other rare fritillaries abound; besides *Sinapis*, *Hero*, the *Zygenidæ*, &c.

To return. We arrived at Brockenhurst on August 8th, and put up at the "Rose and Crown" (proprietor, James Ings), where we had, a week previously, ordered beds. Nothing could be more cheerful than our rooms, and during our whole stay we were most comfortable, while the charges were reasonable. After a good lunch, we sallied forth for a couple of hours, and—considering that the weather was bad—obtained a very fair "bag." In the evening, however, we were not so fortunate, as we only took one *Promissa* and a few *Pyramidea*; although the weather was suitable, rarities would not appear.

The next morning we went through the Forest to Lyndhurst, on the right side of the road for about halfway, and then on the left. We saw innumerable *Paphia*—all more or less rubbed—two *Sibylla*, and "buttered" a female *Iris*! This splendid lady was sipping the nectar from a bramble blossom, when down came the net over her, but, alas! her imperial majesty quietly glided downwards through the thorns, evading the death-dealing gauze, and soared triumphantly to the top of a neighbouring oak. This damped our spirits, but they soon rose when we captured two *Argiolus* and a pair of *Quercus*. The latter we found very abundant at the tops of young oaks; so at length we devised a plan for their capture, and having cut down a straight birch "stick" of about 15 ft. long, and fixed a net at the top; after two days' practice we succeeded in taking eighty specimens in less than a couple of hours; the abominable Forest flies tormenting us all the time above measure. We saw daily a few *Iris* besporting themselves above and around the high oaks, but they were inaccessible.

From August 8th to 10th, the weather was unpropitious; as clouds, wind, and rain are not compatible with fly-catching. However, as we liked the sylvan beauties of the places we had visited, and as we feared "to go farther and fare worse," our daily plan was to start from the "Rose and Crown" about nine, go through the Forest to Lyndhurst (about three miles direct), where we arrived about one. Then after lunching at the "Crown and Stirrup" (three minutes from forest, proprietor Charles Pack, who lets apartments), we returned through the Forest, arranged our captures, dined, and set off for sugaring.

At length we were told of a place where *Sponsa* was said to abound. "Some gentlemen *'uv* took fourty a noight this season," said our informant. Thither we determined to go, and the following evening (August 13th) we started, equipped with bags full of empty pill-boxes, chloroform and cyanide bottles, and corked boxes well stocked with No. 6 pins. We arranged to sugar 150 trees, and keep on visiting them till we were tired. We had sugared over 100 when an individual approached armed with a net, a

cyanide-bottle and a corked box. We tackled him. "Any *Sponsa* about? Wy bless yer, 'eaps on 'em. Thur's one on that thur tree now." Our blood was up, we longed to dart at it, but it was that man's tree, and we refrained. He told us he had taken 120 in three nights, and that his usual nightly haul was from twelve to twenty. We asked him how many trees he "painted." "Wall," he said, "I begun doin' about thirty, but w'en they're plentiful I doaint have no time to look at more'n about six trees; there's ten on a tree sometimes." We were roused to mad excitement; in half an hour we had taken *a dozen* on as many trees. Many flew off, and that night we had no nets. It was now 8.30, and we met our friend going home. "They're ovur for to-noight," said he. We stayed another half-hour, but took only a couple on his trees.

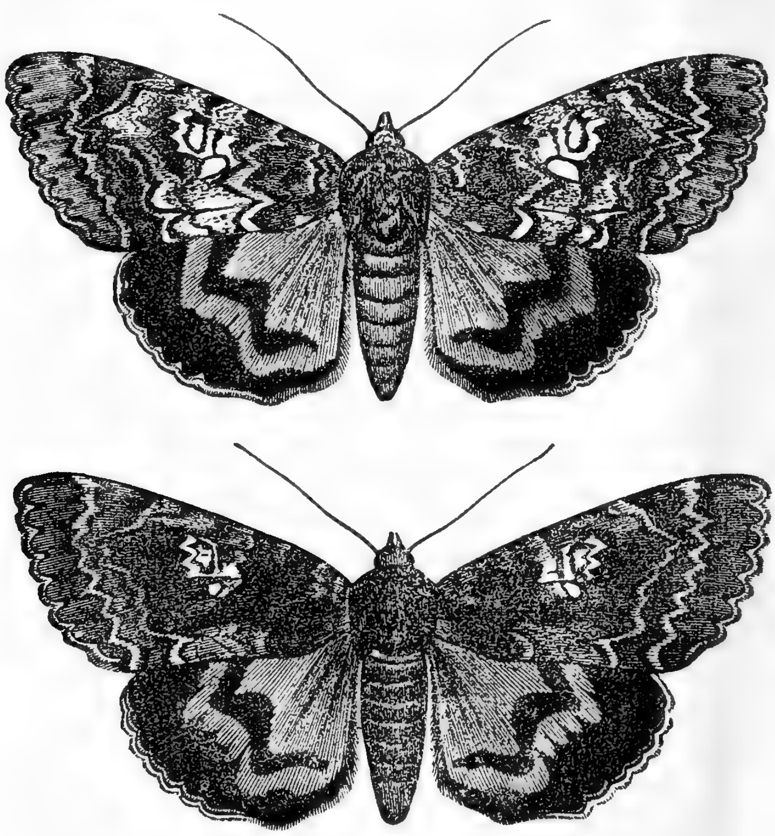

Fig. 17. Dark-crimson Underwing Moth (*Catocala sponsa*).

The next night, having found that *Sponsa* flew early, we sugared earlier, and before dark had taken another dozen *Sponsa*, and two or three *Promissa*, besides the rare *Subsequa*. We had intended going to the Isle of Wight on the 15th for Hyale and Helice; but another *Sponsa* hunt was not to be winked at. That night we captured twenty-one *Sponsa* and two *Promissa*, while the multitudes of *Pyramidea* were as usual a perfect pest.

To see whether any *Sponsa* are settled on sugar needs some practice, when their wings are folded over their backs—especially in the dusk—as the upper wings resemble closely the bark of the trees; when, however, the wings are partly expanded—showing the splendid crimson bands—I can hardly imagine a more exciting sight; the very thought of it makes me thrill even now. Our mode of proceeding was to pill-box the moths, pour in a drop of chloroform, and when they were quiet, pin and remove them to the corked box. When we got home they were stabbed with oxalic acid. If they were too wary for the pill-box or cyanide-bottle, we netted them, and then pill-boxed. We thus found half a dozen pill-boxes ample.

At length, on the 16th, we left Brockenhurst with sad hearts, took the train to Lymington, and steamed across the Solent, at the rate of four miles an hour, under a hot sun, to Yarmouth, in company with a flock of sheep and a fat farmer, who was much wrapped up and enduring all the agonies of sea-sickness. We were greeted by numerous *Edusa, Cardui,* and *Polychloros,* besides innumerable *Atalanta.* Having "humped" our knapsack, we marched on the west side of the Yar to Freshwater. Wishing to be near the sea, we scorned the respectable Red Lion Inn, and put up at the Albion, Freshwater Bay, where we were duly charged next morning. That afternoon we walked towards Alum Bay, but a strong gusty wind prevented anything more than a grand view from the beacon above the Nodes, and the capture of a few *Corydon* and *Edusa.* As the weather continued unfavourable the next morning, and it was incumbent upon us to be in London by Saturday, we threw over our plan of walking to Shanklin, Ventnor, and Cowes, and determined to have another evening at *Sponsa's* headquarters. We therefore went back to Yarmouth, where we netted many *Edusa, Galathea, Cardui,* and a hybernated *Helice,* and then returned to Brockenhurst. We were rewarded: over *two dozen Sponsa* requited our endeavours before 7.45, when the moon shone brilliantly, and the underwings retreated to the tops of the oaks.

This brought our Hampshire expedition to a close, and the next lepidoptera I saw—three days after — were some *Edusa, Io, Cardui,* &c., in the picture-galleries of The Hague, Haarlem, and Amsterdam, calmly flitting round and settling on bouquets which, though painted a couple of centuries ago by Mignou, Ruysch, and others, still retain much of their original freshness.

The following is a list of thirty-one *diurni* we saw in the New Forest:—*Rhamni, Edusa, Brassicæ, Rapæ, Napi, Galathea, Ægeria, Hyperanthus, Megæra, Semele, Tithonus, Janira, Pamphilus, Sibylla, Atalanta, Io, Polychloros, Urticæ, Cardui, Iris, Quercus, Betulæ, Adippe, Aglaia, Paphia, Phleas, Argiolus, Alexis, Artaxerxes, Sylvanus,* and *Linea.* We were informed that this year had been bad for *Valezina,* and especially for *Sibylla.* Of the latter we only saw half a dozen, while ten days before they were abundant in Essex. *Orion* and *Batis* had been plentiful.

A PLEA FOR THE MICROSCOPE AS A TOY.

WE are often reminded that the microscope is no longer a toy, but a scientific instrument, and those who use it for recreation only are not unfrequently hard hit, as mere wasters of time and desecrators of a noble power.

Now, while fully appreciating the scientific use of the microscope, I would suggest a slight alteration in the above dictum, and say, it is *not only* a toy, but a scientific instrument. I would plead for it as a source of amusement. The President of the Quekett Club, in his recent address, reminds us of a remark in the first page of the "Microscopic Journal" of 1841, where it is said of microscopic research in those days, that it "is for the most part an amusement rather than a profession"—it is an "intellectual pastime, which is sure to terminate in beneficial results. General knowledge may be acquired by observation," and this "by industry and perseverance imperceptibly produces recondite science." This is just the view I would take of microscopical employment. It is first an "intellectual pastime." Wearied in body and mind the man of business or of literature seeks rest. Some find it in mere lounging in an easy-chair, and joining in the family chit-chat; others in listening to the music which a wife or daughter elicits from the pianoforte. There is no objection to this; but if the taste leads to the observation of nature in the sky, the earth, the sea, then a special interest is felt in whatever tends to reveal the secrets of that existence by which we are surrounded. Some turn to the telescope, others to the microscope, not as a means of scientific research, but as "an intellectual pastime." Investigation requires powerful effort, both of mind and body. Few have this to expend now-a-days on what does not bring grist to the mill. The mind wants recreation, as the appetite longs sometimes for change of diet and enjoys the dainty bit. The holiday keeper rushes into the country, not to study, but to enjoy, its beauties. He visits the picture gallery, not to become an artist, but to satisfy a taste. He goes to the British Museum or the Zoological Gardens not to become a naturalist, but to enlarge his ideas. He cultivates a variety of sweet and pretty flowers in his garden, not with the remotest intention of becoming acquainted with their orders and relationships, but purely for the enjoyment to be derived from them. And why may a man not use his microscope in the same way? What wonders—what beauties—does it reveal! Well has it been said that the microscope is a door into another world. It is so, and the man who uses it merely as such is amply rewarded. The door is opened and he is almost bewildered with the variety and beauty of what he sees. His mind is enlarged, his views are corrected; his taste is charmed, his wonder excited. The whole man is elevated, refreshed, and invigorated. It is not only a pastime, but "an intellectual pastime."

But, further, we are told it is "sure to terminate in beneficial results." This "intellectual pastime," then, does not as a rule stop there. It is not a lovely vision which vanishes away, but is an avenue to a brighter and broader view. It induces the habit of observation, and surrounds even the least things with a halo of interest which they could never otherwise have possessed. The smut on the ear of corn—the disease of the leaf of the potato—the mould on the cheese—all are now full of interest. The most unpromising object often exhibits a most unexpected character, or reveals a long-looked-for secret. And thus the mind is not only refreshed but stored with a new fact, which in its turn proves to be only the cradle of another: so, step by step, the "beneficial results" are evolved. And great as these are in an educational and abstract point of view, they are by no means wanting in a practical, as the application of the microscope to physiological, histological, and commercial subjects, abundantly proves.

Let us begin, then, by play. If it ends here it is at least as innocent and pleasing as any other—let some of us begin by using our microscopes as toys, let others use them so sometimes, for the amusement of the uninitiated—it is "an intellectual pastime which is sure to terminate in beneficial results."

This toy, moreover, is not an expensive one, either to begin with, or to keep going. If you buy a gun there is the annual licence, and the constant supply of ammunition. If you buy a horse, the first outlay is nothing compared with the keeping of it. But when once you are provided with a microscope, there is no tax to pay, no food required. Let this be a plea for getting a fairly good instrument at first, capable of being added to as required. Even the magic-lantern soon tires unless new slides, which are very costly, be continually added. Having, then, this toy, we learn to find objects which cost us nothing, but, on the contrary, contribute largely to our pleasure and profit. It has, too, a great advantage over the telescope. You have not to wait for cloudless nights, nor to run the risk of colds and neuralgia. Every night is a microscopical night, and the long dark evenings of winter may be not only beguiled but improved.—T. R. J., *Codicote Vicarage.*

PARASITES ON FISH.

By JOHN DAVIS.

THE subject of the various parasites found on fish has not hitherto received much popular attention, except in Van Beneden's "Animal Messmates." It is hoped, therefore, that the following description of three of such parasites may induce other naturalists to contribute further information on this subject to the pages of SCIENCE-GOSSIP.

Parasite of Cod (*Gadus morrhua*) taken from the outside of the gill (there is another parasite which infests its back).—The tail is composed of two tubes, finely marked, which commence at the end of the animal at each side, and gradually narrow until they meet. These tubes are nearly as long as the body. The size of the specimen is $\frac{5}{16}$ of an inch, and the objective used in this instance was $1\frac{1}{2}$-inch, with C eyepiece.

The Gurnard (*Trigla hirundo*) has parasites: this one was taken from the eye, to which it fastens itself by the large wheel-like sucker; it then bends its body until it brings the small rings at the end of the animal on the fish, and so jerks itself along. I have drawn one end of the large sucker, as seen under a $\frac{1}{4}$-inch objective. The length of this parasite is about $\frac{1}{4}$ inch, and perfectly white.

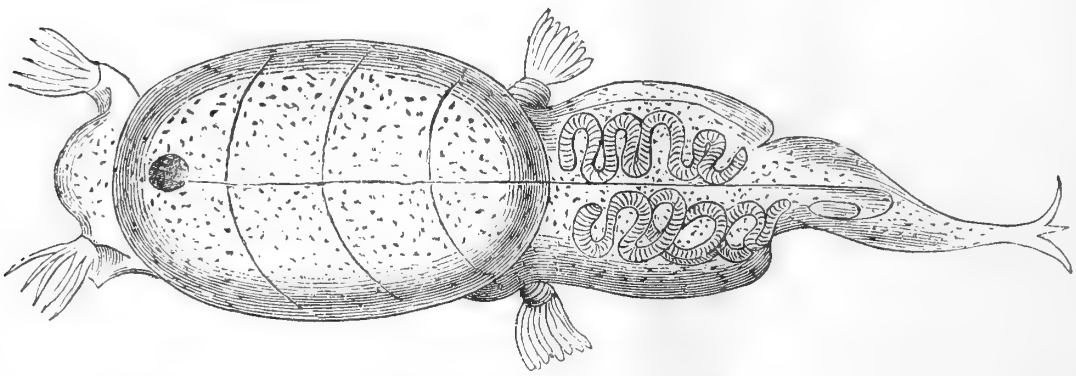

Fig. 18. Parasite of a Ling; 3-inch object; size, $\frac{6}{16} \times \frac{3}{16}$; pale yellow and pink spots, with a dark brownish-pink eye.

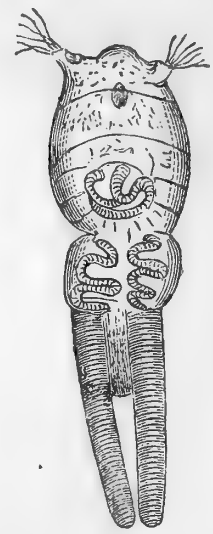

Fig. 20. Parasite of a Cod; $1\frac{1}{2}$-inch; size, $\frac{5}{16}$; opal-white, with a pink eye-spot and dots.

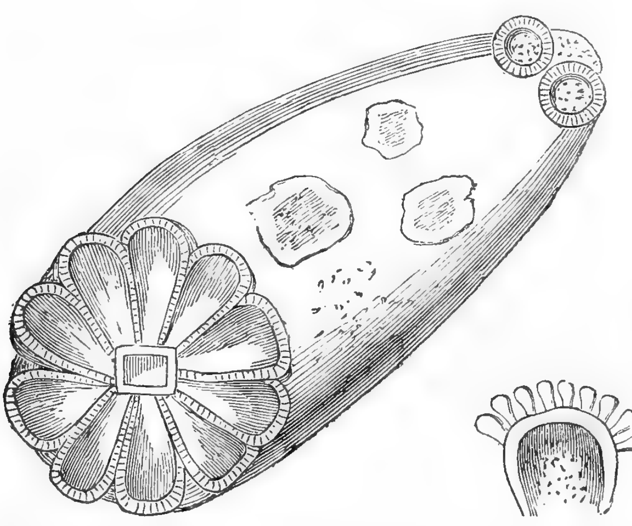

Fig. 19. Parasite of Gurnard.—This parasite infests the eye of the fish: it is a milky-white in colour and $\frac{1}{4}$ inch long; it moves about like a caterpillar; $1\frac{1}{2}$-inch A eyepiece.

End of sucker through a $\frac{1}{4}$-inch.

Parasite of Ling (*Molva lota*).—The integument of this parasite is covered with small spots and lines, and the body is of a dense opal-white. An indistinct œsophagus (on account of the thickness of the animal) can be traced from the eyespots to the stomach. The latter is composed of a spiral arrangement of tubes, and marked with cross-lines, the same as the antenna of the Lobster. It is a pretty sight to watch the circulation in these vessels. At the dorsal end is a rather large cavity, which I take to be the ovary. The size of this parasite is $\frac{6}{16} \times \frac{3}{16}$, and examined through a 3-inch objective. It was taken from the back of the fish.

WHITE MITES.

During the month of June, 1877, whilst driving in the country, I observed a black poplar tree evidently suffering from the ravages of insects; I therefore stopped the vehicle, and got out to examine. I found the tree bored in many places by the larvæ of the Goat-moth (*Cossus ligniperda*), three of which I secured. A considerable portion of the bark was loose, and the sap kept this quite wet, the peculiar smell produced by the larvæ being very evident. On removing a portion of the bark where it was moist with sap, I found it covered with a moving mass, consisting of myriads of very peculiar White Mites. On examining them under the microscope, I found them to differ from any Mites I had ever seen, nor could I find any notice of similar ones in any work to which I could refer. The females, which were in the greatest abundance, were egg-shaped, the larger end being in front, and the sides towards the posterior, somewhat bent in. On slightly compressing them, they were seen to contain eggs. The abdomen was of a milk-white colour, and the legs reddish-brown. On crushing one of the Mites containing eggs, one or two young ones escaped from the almost mature ova; these had only six legs, one of the hind pair being missing. The males, which were few in number compared with the females, were very peculiar in appearance; their bodies were less in size, flatter, and the legs longer and stouter in proportion than those of the females; the posterior pair not used

for walking, but stretched out backwards, their extreme ends bent inwards, and, as far as I could make out, not furnished with claws. Their gait was extremely awkward. In certain *Dermaleichi*, found on small birds, the males have one of the hind pairs of legs very largely and peculiarly developed, but in their case it is the third, the fourth pair being very small, and used in walking.

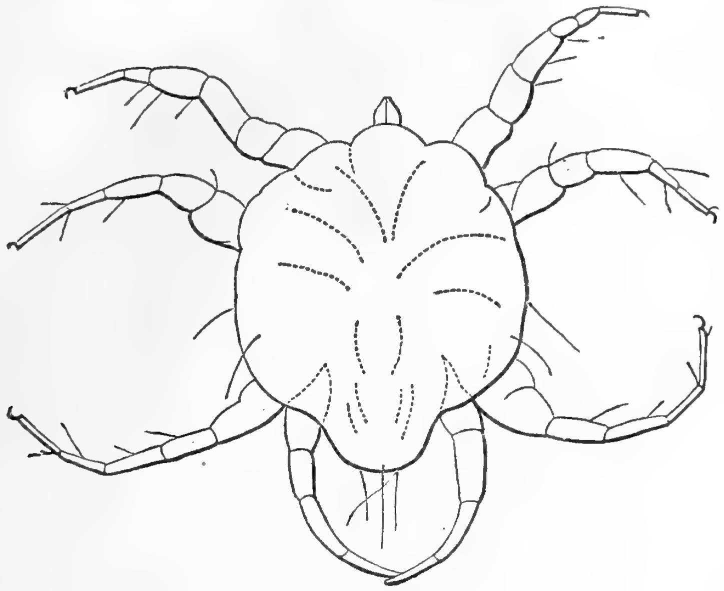

Fig. 21. Male of White Mite.

Fig. 22. Female of White Mite.

About the middle of August I again visited this tree, and found upon and with the White Mites a number of *Hypopi*, but whether these were parasitic on the White Mites, or merely residing with them, I was not able to determine. I passed this tree on several occasions during the summer, and frequently saw Wasps and Red Admiral Butterflies enjoying the sap, which kept some parts of the tree continually moist. The figures are all drawn from mounted specimens under a $\frac{2}{3}°$ object-glass,

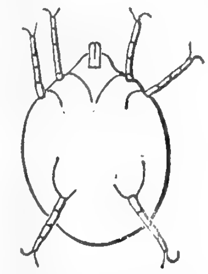

Fig. 23. Young of White Mite.

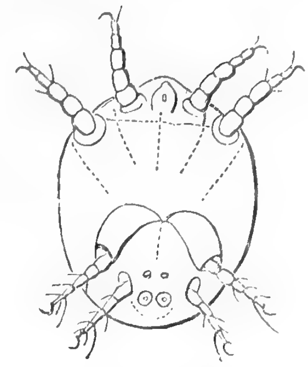

Fig. 24. *Hypopus* found with White Mites.

with A eyepiece, and are magnified about 72 diameters.

Kirton Lindsey. C. F. GEORGE.

THE HISTORY OF OUR SALAD HERBS.

PART III.—MUSTARD.

MUSTARD was, according to the belief of the ancients, first introduced from Egypt, that country which claims the honour of being the birthplace of Ceres, the goddess of seeds, and Æsculapius, the god of medicine, through whose means this plant was made known to mankind as an agreeable and wholesome herb in its green state; while the seed was used as a medicine, and occupied the first rank among alimentary substances which exercised a prompt influence on the brain. Mustard is mentioned by Pythagoras, and was employed in medicine by Hippocrates, B.C. 480. Pliny states that there were three kinds of mustard cultivated in his day; the first of a thin and slender form, the second with a leaf like that of the rape, and the third with that like the rocket. The best seed, he says, was imported from Egypt, but that this plant grew in Italy without sowing. The Romans made great use of the seed in medicine; the oil extracted from it, mixed with olive oil, was used by those who suffered with stiffness of their limbs after a cold bath. Pounded with vinegar it was employed as a liniment for the sting of serpents and scorpions, and a dose of it effectually neutralized the poisonous properties of fungi. The Romans, and other nations after them, used to ferment mustard-seed in new wine, which converted it into a kind of inferior brandy, and was known by the name of *Mustum ardens*, burning wine.

The mustard-seed mentioned in the Scripture has of late years been a matter of considerable controversy, some authors supposing it to be quite a different plant from the one we are now treating of; but it is generally believed by the best authorities in the present day that the plant referred to was *Sinapis nigra*, the common mustard, which is indigenous to Palestine, as it is to Britain. Dr. Thompson, in his "Land and the Book," records that he has seen this plant as tall as the horse and his rider in the rich plains of Acre.

"As small as a grain of mustard-seed," appears to have been a proverbial expression for any small object among the Jews; and this seed, which was the smallest the husbandman was accustomed to sow, produced the largest results by becoming the greatest of the husbandman's herbs.

We have no record when mustard was first used in this country, but in the household accounts of the thirteenth and fourteenth centuries we find that mustard was known to our forefathers under the name of "Senapum," and appears to have been used in large quantities, for in that interesting Household Book of the Earl of Northumberland, in the reign of Henry VII., it is stated that 160 gallons of mustard-seed was the allowance per annum to his servants and retainers. In those days the seed was not manufactured, but brought to table whole, when it was bruised and mixed with vinegar, according to the taste of the eater. It was not only used as a condiment, but also, no doubt, for medicinal purposes. Tusser, who wrote his "Five Hundred Points of Good Husbandry" in the reign of Queen Mary, says, in the direction for February,—

"Where banks be amended or newly upcast,
Sow mustard-seed after a shower be past."

From this it appears that mustard was cultivated as a field crop; we also find it mentioned as an agricultural produce in Rogers's "History of Agriculture and Prices in England," as far back as 1285. It must then have been *S. nigra*, black mustard, or *S. arvensis*, the charlock, for Gerard tells us that the garden mustard, which produces the whitest of seeds, had not become common in the days of Queen Elizabeth, but that he had distributed the seed into different parts of England to make it known. He says, "Mustard makes an excellent sauce, good to be eaten with gross meats, either fish or flesh, because it promotes digestion and sharpens the appetite." Thomas Cogan, M.D., of Manchester, who published his "Haven of Health" in 1605, says, "The force of the seed is well perceived by eating mustard, for if it is good in making to weep we are straightway taken by the nose and provoked to sneeze, which plainly declareth that it soon pierceth the brain. Wherefore as it is a good sauce and procureth appetite, so it is profitable for the pulse, and for such students as be heavy-headed and drowsy, as if they would fall asleep with meat in their mouths. And if any be given to music, and would fain have clear voices, let them take mustard-seed in powder, work the same with honey into little balls, of which they must swallow one or two down every morning fasting, and in a short time they shall have very clear voices." Shakspeare mentions mustard as a condiment in his play, "Taming the Shrew," act vi., scene iii., where *Grumio* says to *Katharina*, "What say you to a piece of beef and mustard?" It is also mentioned in his play "As you like it," in connection with pancakes (see scene iii.). In Evelyn's time, Tewkesbury was famous for its mustard. The seed, Coles tells us, in 1657, used to be ground there and made up into balls, which were brought to London and other remote places as being the best the world affords. Mustard used formerly to be largely cultivated and manufactured in the county of Durham; but until the year 1720 the seed used to be pounded in a mortar and coarsely separated from the black integuments of the seeds, and in that rough state prepared for use. About the year mentioned an old woman of the name of Clements, resident at Durham, conceived the idea of grinding the seed in a mill, and to pass the meal through the several processes which are resorted to in making flour from wheat. The secret she kept for many years to herself, and in the period of her exclusive possession of it supplied the principal parts of the kingdom, and in particular the metropolis with this article; and George I. stamped it with fashion by his approval. Mrs. Clements used to travel twice a year to London for orders, and was able to pick up a small fortune. From this woman's residence at Durham, it acquired the name of "Durham mustard" (*Mechanic's Magazine*, vol. iv., p. 87). The seeds of *Sinapis arvensis*, charlock, and *Raphanus raphanistrum*, the wild radish common in our corn-fields, are often sold and used as a substitute for mustard-seed. The seed of the black mustard, like that of the wild sort, and also of the wild radish, if sown below the depth of three or four inches, will remain in the ground for ages without germinating: hence when once introduced it is difficult to extirpate. Whenever they throw the earth out of their ditches in the Isle of Ely, the banks come up thick with mustard, and the seeds falling into the water and sinking to the bottom will remain embalmed in the mud for ages without vegetation (Loudon's "Encyclopædia of Agriculture").

Sinapis alba appears to be a native of the more southern countries of Europe and Western Asia. It is now cultivated not only as a garden herb, but is grown very largely as an agricultural crop, chiefly as food for sheep or to be ploughed in for manure in its green state. Mustard is extensively cultivated in the Fen lands of Lincolnshire and Cambridge, also in Essex and Kent. Its medicinal properties are well known; in its action it is an irritant, stimulant, emetic, and stomachic.

Some authors think *Sinapis* is derived from *sino* to hurt, and *opis* the eyes, from the pungency of the plant causing the eyes to water; others from the Celtic *nup* (modern Gaelic *neup*) a turnip which belongs to this tribe. Our word "mustard" is derived from the French *moutarde*, but in early times it was, both here and on the Continent, *sauve* or *senevé*. Some authors assert that the etymology of this plant was changed from the following circumstance. In 1382 Philip the Bold, Duke of Burgundy, was marching against his rebellious subjects of Ghent, and the city of Dijon, which traded largely in *senevé*, supplied him with a thousand men-at-arms, for which service

the Duke granted that city many privileges, amongst others that of bearing his arms, with his motto "*Moult me tarde*" in old French (I long or wish ardently), which was carved on the principal gate of Dijon. By some accident the middle word was destroyed; the other two, *moult tarde*, caused many a smile at the expense of the citizens, and in derision the *sencvé* in which they traded was called *mourtarde*, a name it has preserved ever since.

MICROSCOPY.

ACTINO-CYCLUS BERKLEYI.—I have some specimens of this diatom, with reference to which I shall be glad if one of your correspondents will give me a little information. I should like to know, in the first place, whose nomenclature *A. Berkley* is; and, secondly, whether it is synonymous with any of the species described in the fourth edition of Pritchard's "Infusoria"; if not, where are the specific characters to be found?—*C. V. S.*

RESEARCHES AMONG THE SPONGES.—In the last number of the "Annals and Magazine of Natural History" there appear several important articles on the structure of various kinds of sponges. W. Saville Kent commences with one on "Professor Ernest Haeckel's group of the *Physemaria*, and on the affinity of the Sponges." W. J. Sollas describes two new and remarkable species of *Cliona*. There is also a paper by C. Mereschkowsky, on *Wagnerella*, a new genus of sponge allied to the *Physemaria* of Haeckel.

MOUNTING MARINE ALGÆ.—Mr. H. F. Atwood, of Chicago, gives the following account of his method of mounting algæ, in the November number of the "American Journal of Microscopy." Mr. Atwood advocates the use of salicylic acid, and says—"My process is as follows: by using sea-salt (which can be bought for a trifle at any first-class druggist's) and distilled or rain water, a good substitute for sea-water is obtained; into this I immerse the rough-dried specimens of algæ, and in an hour or two they have resumed their natural shape. Now, picking out and clipping off such pieces as are best adapted for mounting, I transfer them to a bowl of distilled water, and wash them clean, and from thence transfer them to a small saucer containing a saturated solution of salicylic acid. The shallow cell into which they now go is built up of shellac cement, made by dissolving bleached shellac in Cologne spirits. Cells made of this substance are ready for use twelve hours after being laid on to the slide. I pick up the specimen with forceps, put it on the slide, and fill up the cell with the salicylic acid. I now breathe on the covering glass, and put it in its place, and by the use of blotting-paper absorb the superfluous fluid. A thin coating of gold size completes the work for the time being; in a day or two I lay on more gold size, and afterwards white zinc cement or Brunswick black; the finish, of course, being a mere matter of fancy. In mounting a piece of algæ having *Isthmia* parasitic on it, it is almost impossible to fill these diatoms if balsam is used, whereas by the use of salicylic acid every valve will be filled. In some cases the medium I have used has robbed the algæ of its colour, but this occurs but rarely. I have a slide of *Ptilota hypnoides* in full fruit, the beauty of which could never be brought out except by first immersing the specimen in the sea-water I have referred to. For the study of algæ, direct light should be used, but using dark field illumination is the best way."

THE QUEKETT MICROSCOPICAL CLUB.—The last number of the Journal of this well-known and useful club contains an address by the President, Mr. Henry Lee, F.L.S., and a paper by Mr. W. K. Bridgman, on "The Ordinary Condenser Improved, or 'Circular' Illumination Superseded."

COLOURED OYSTERS.—The oysters of the celebrated Arcachon beds having last summer acquired a peculiar violet colour, the cause has been inquired into by M. Desconst, who finds it was due to the exceeding abundance of the highly-coloured spores of a sea-weed (*Rhytiphlœa tinctoria*). The colouring matter of these spores had been assimilated by the oysters, and retained by them, the extreme drought of the summer months having favoured the operation by reducing the water until it was not sufficient to dissolve the colouring matter.

THE SPORE-PRODUCING POWER OF FUNGI.—At a recent meeting of the Linnean Society, Mr. Worthington Smith exhibited drawings of *Boletus subtomentosus*, and stated that in a specimen five inches in diameter, there are 17,000 pores, or tubes. Each pore when cut across shows 2,000 cells on the surface. The number of surface-cells on the under side of a specimen is 36,000,000. The cells in an entire plant are calculated at 615,000,000,000; and the number of spores produced by the same specimen are 5,000,000,000.

PARASITIC ALGÆ.—Professor Percival Wright has described a new species of *Chytridiaceæ* under the name of *Rhizophydium Dicksonii*. It was found parasitic in the cells of a sea-weed (*Ectocarpus granulosus*), and it is believed that the so-called "utricular" fruits of Harvey, and the "spores" of Kützing, are, in the *Ectocarpus* at least, in reality parasitic *Chrytridia*.

CARNIVOROUS SLUG.—No doubt the slug which your correspondent in the November number (p. 260) saw feeding on a worm was *Testacella Maugei*, of which a full and interesting description is given on page 89 of SCIENCE-GOSSIP for April, 1867.—*W. R. Tate.*

ZOOLOGY.

THE POPULAR SCIENCE REVIEW commences the new year well. Besides a capital summary of scientific progress, and many well-written and very fair reviews, there are articles as follow :—"On some Armour-plated Fishes," by H. Woodward, F.R.S.; "The Old and the New Chemistry," by M. M. Pattison Muir, F.R.S.E.; "The Geological Antiquity of Flowers," by J. E. Taylor, F.G.S.; "Cloud Outlines," by Rev. S. Barber, F.M.S.; "The Extinct British Wolf," by J. E. Harting, F.L.S., &c.

NEW AUSTRALIAN MARSUPIAL.—Professor Owen has recently described a new marsupial animal from Australia, under the name of *Pleopus nudicaudatus*. It is a small creature, allied to the Kangaroo-rats, but distinguished by having the type number of mammalian toes (five) on each of the hind feet.

THE FURNITURE BEETLE.—F. Hughes cannot do better than rub the furniture affected by this pest with carbolic acid, and let the latter soak into the wood. He will see no more of the beetles after this treatment.—*A. Smith.*

GLYCIPHAGUS PALMIFER.—I was staying for a few days at Christmas in a country house at Austrey, in Warwickshire, and one wet morning it struck me that I would brush the wall of the beer-cellar, and have a microscopical examination of the result. I was rewarded by finding a considerable number of the extraordinary mite *Glyciphagus palmifer*.—At the time of the publication of Mr. Murray's late work on the Aptera (where this insect is figured) this remarkable species does not appear to have been known as an inhabitant of this country, although Mr. Murray anticipates that it may be one. Possibly, therefore, this may be the first instance of its capture here.—*Albert D. Michael.*

THE BEAKED WHALE.—In the last number of the *Zoologist* there is a capital description by Mr. Henry Lee, F.L.S., of the Beaked Whale, *Hyperoodon rostratus*, killed last September in the Menai Straits, and afterwards publicly exhibited at Bangor. This species is one of the Ziphioid Whales, an intermediate group between the Cachelots and the Porpoises and Dolphins; and it is characterised by having its teeth reduced to a single rudimentary pair at the tip of the lower jaw.

MIMICRY IN INSECTS.—At a recent meeting of the Entomological Society of London, Prof. Westwood gave an account of a remarkable Mantis (*Gongylus gonegyloides*) which mimics a flower, the deception being supposed to attract the insects upon which the Mantis feeds, to their destruction.

NOTES ON RARE LEPIDOPTERA, &c. — Referring to Mr. Molony's note in October SCIENCE-GOSSIP, on the occurrence of *C. Celerio* on Aug. 29, Mr. Stainton, in the "Manual," gives October as the month for the perfect insect to appear, and Mr. Molony is, therefore, right in his statement of its being early in its appearance. It is a curious fact that though *Colias Edusa* has positively swarmed on the S.E. coast this summer, very few rare *Helice* have been taken, and its congener *Hyale* has not been seen there, but has occurred quite inland. Mr. S. Machin took (last August) a very fine specimen of *C. Hyale* in a wood near Henley, Oxfordshire. Last year I find among my specimens of Heterocera a fine one of *Acronycta tridens*, taken in Hillgrove-road, Avenue-road, N.W. The occurrence of this species near London, I believe, is unusual. September 13th, two specimens of *Edusa* seen in a street leading to the Hampstead-road (viz., Frederick-street), and I last saw it in Regent's Park, on September 15th. Since then it seems to have disappeared. It will be interesting to note if it appears again this year on any fine, mild day.—*R. T. Gibbons.*

PLANTS FOR REPTILE VIVARIA.—Probably the only plants which would succeed in a Reptile case are succulents, such as *Sedums* and small *Sempervivums*. These, I know, will flourish; but my slight experience tells me that it is better to consider plants as entirely secondary objects in a vivarium of any kind, and in Reptile cases to do without them altogether. I experience but little difficulty in the winter with respect to food. Mealworms can be obtained from the miller's, and kept in barley-meal as long as one pleases; common earth-worms are also useful; while, in order to secure flies during the winter months, I place fly-blown meat in a tightly-closed box, having bran at the bottom two or three inches deep. I place the box in an outhouse, and supply fresh meat twice a week, till the worms become chrysalides or gentles. Then I remove the box to the coldest part of the house, till flies are required, which I can obtain by taking a few of the gentles to a warm room for a day or two, so as to hasten the hatching process. Sometimes, however, the flies will hatch out, in spite of all precautions, in which case I keep the flies in the same box, and feed them with fruit and sugar and water.—*W. T. H. C. Trome.*

BADLY-BLOWN EGGS AND PRESERVING ANIMALS. —I should recommend "G. T. B." to try a solution of carbonate of soda for dissolving out the hardened contents of his egg-shells. He must take care to wash the inside of the egg well with clean water after using the carbonate of soda, and to prevent its coming in contact with the outside of the shell. "W. G." will find a chapter by Mr. Waterton on preserving insects for the cabinet, in the 1839 edition of his "Essays on Natural History," p. 72. Mr. Waterton also gives instructions for preserving birds' eggs, p. 65, but I should not recommend their adoption. In a chapter at the end of his celebrated

"Wanderings in South America" (1825 edition), Mr. Waterton fully explains his mode of preserving birds; the process is very tedious, but the result, as I can testify, is very beautiful. Both this process and that of preparing insects would be too long to give an account of here.—*T. S.*

Preserving Animals.—The basis of Waterton's proceedings was the preservation of his specimens by the use of bichloride of mercury dissolved in alcohol. This hardens the skins and causes them to retain the shape in which they are placed when wet for any length of time: thus no *wires* are necessary. "W. G." will find the whole process most minutely described in "Waterton's Essays on Natural History," *new edition*, F. Warne & Co., price 7s. 6d.—*W. B. R.*

Preserving Animals.—The late Mr. Waterton had a peculiar mode of his own of preserving animals, an account of which will be found in his life by Mr. Hobson. It is not, however, by any means, equal to the present mode by a skilful artist of setting up birds. If "W. G." wants a ready way, let him eviscerate a bird, place it in the position he wants, and then fill it with cotton soaked in carbolic acid dilute; and the bird will be preserved for ages. This does not do, however, and is given up for the skinning process.—*C. R. Bree, M.D.*

Later Appearance of the Hirundinidæ.—"R." will be interested to hear that I have in my possession the nest and one egg of *Hirundo rustice* (*Chimney swallow*), which was taken while the bird was sitting; she having been duly watched when building in a cart-shed at Walton-on-the-Naze, in December, 1866. See *Field*, January 12th, 1867.—*C. R. Brec, M.D.*

Badly-blown Eggs.—Let "G. T. B." get Prof. Newton's little Essay upon blowing and preserving birds' eggs, which he can buy for a shilling or so, and he will get all the information he wants.—*C. R. Bree, M.D.*

The "Midland Naturalist."—It is with much pleasure we welcome this new literary labourer into the field of popular science. Like the *Scottish Naturalist* (which relates chiefly to the Natural History of Scotland) and *The Naturalist* (the organ of the West Riding Natural History Societies), the *Midland Naturalist* purposes to give preference to local scientific information, and to chronicle the doings of the numerous energetic clubs and societies which are springing up in central England. Among these are the following:—Various societies in Birmingham, Burton, Caradoc, Dudley, Derbyshire, Leicester, Northampton, Nottingham, Rugby, Oswestry, Severn Valley, Shropshire, Stroud, Tamworth, &c. The first number of the *Midland Naturalist* appeared on January 1st, and appears with an attractively got-up cover designed by Worthington Smith. It contains well-written articles on Ferns, Meteorology, Zoology, and Geology.

BOTANY.

Further Notes on the Flora near Cader Idris.—Seeing from the "Botanical Notes in the Neighbourhood of Cader Idris," and also from another correspondent in the September number, that there are some of your readers interested in the plants of that neighbourhood, I should like to mention a few more to be found there, in addition to those already specified:—*Saxifraga stellaris; Melittis Melissophyllum* (bastard balm); *Impatiens noli-me-tangere* (yellow balsam); *Ranunculus Lingua* (great spearwort); *Sedum telephium*; *Euonymus europæus* (spindle tree); *Asperula odorata* (woodruff); *Ruscus aculeatus* (butcher's broom); *Narthecium ossifragum* (bog asphodel); *Myrica Gale* (bog myrtle); *Lobelia Dortmanna*, found in Llynn Creigenau, and also in Llynn Cyri, another lovely little tarn not far off, nestling close in under the mountain. Nearer to the sea I found *Eryngium maritimum* (sea holly); *Aster Tripolium* (Michaelmas daisy); *Statice Limonium* (sea lavender); *Crithum maritimum* (samphire); *Silene maritima* (sea campion); *Rosa spinosissima* (burnet-leaved rose); *Tanacetum vulgare* (tansy), found at Llangrwyll, a village four miles south of Arthog. *Asplenium maritimum* grows on the cliffs between these two places; and to the list of Ferns I can also add, having found *Asplenium viride* and *Hymenophyllum tunbridgense* on the Llynn y Gader side of Cader Idris. These plants were found in the month of August, during a week's stay at Arthog, a village on the Dolgelly side of the estuary, nearly opposite to Barmouth; and the district through which they range is included in walks the farthest point of which reaches Llynn Gader in one direction, and in another stretching along the coast three or four miles south of Arthog.—*A. Warner.*

The Watford Natural History Society.—The eighth part of the "Transactions" of this vigorous society contains a capital paper by the Rev. George Henslow, F.L.S., on "The Fertilization of Plants," and another on "Instructions for taking Meteorological Observations," by William Marriott, F.M.S.

The Influence of Trees on Rainfall.—From observations by M. Fautrat, relative to the comparative influence of leafy woods and resinous woods on rain and the hygrometric state of the air, recently communicated to the Paris Academy, it appears that pine forests have a much greater influence on the hygrometric state than others; so that if the vapours dissolved in the air were apparent, like fogs, we should see forests shrouded in a large screen of moisture, and in the case of resinous woods the vapoury envelope would be more distinct than in that of leafy woods. M. Fautrat also shows that pines retain in their branches more than half of the water which is poured upon them, whereas leafy trees allow

fifty-eight per cent. of the precipitated water to reach the surface of the ground. He suggests, therefore, that in planting with a view to oppose inundations, it would be advisable to choose by preference resinous trees, as offering a better covert.

GENTIANA ACAULIS IN WALES.—As one of the correspondents who felt doubtful as to the occurrence of *Gentiana acaulis* on the Cader, may I be allowed to say the doubt has not been removed? My personal authority about the Cader is of little use, since when, as a boy, I ascended it I was more fond of Lepidoptera than flowers, but I have a distinct impression of seeing a Gentiana there, but neither *acaulis* nor *amarella*, but *campestris*. I see this latter is included for Merioneth in "Topographical Botany," though Mr. Ley does not mention it in his list; but as this list is principally of such plants as are not mentioned in "Topographical Botany," it does not follow that he failed to observe it. The habitat of *campestris*, as given in Hooker's "Student's Flora," is moist, especially hilly pastures, ascending to 2,400 feet in the Highlands. I have gathered it on Ben Lawers at 1,800 feet, where it is not at all uncommon on sub-Alpine slopes, and though *campestris* is very unlike *acaulis*, yet I would respectfully suggest if this might not be the gentian that was noticed;* anyhow the discussion will probably lead to a more thorough search of the Cader shortly by some of your readers. —*G. C. Druce.*

WORMS IN FLOWER-POTS.—These can always be got rid of by watering the plants with a solution to which a tenth part of grated horse-chestnut has been added.

WILD CHERRY-TREE (*Prunus avium*).—As some notice has lately been taken of the size of this tree, I beg to report one as at present existing within a field of my farm, which presents the following proportions:—

2 feet from the ground,			21 feet circumference.	
3	,,	,,	15	,,
6	,,	,,	21	,,
10	,,	,,	19·6	,,

12 feet up to the bifurcation of the branches. This grand tree was first shown me by my friend Mr. E. Lees, when it was in fruit. Since then the hurricane of the 14th October has swept away its principal arm. I figured it on the 5th of November of the present year.—*J. B., Bradford Abbas.*

BRITISH MARINE ALGÆ.—A correspondent of mine, resident in St. Helier's, Channel Islands, writes me that a short time since, a considerable number of the singular sea-weed *Gigartina Teedii*, had there been washed ashore, some of the specimens very fine, and a few of them fertile; this plant has not been discovered on any of the British shores for upwards of fifty years. I have received a few of these specimens also from the French coast, and believe it to be tolerably abundant on the coast of Normandy, and southwards along the west shores. I last year visited Weymouth, and there on the sands picked up a few very interesting specimens of *Gigartina pistillata* in fruit, and also found two or three fronds in very bold form of *Graceolaria compressa.* From that town I proceeded to Bournemouth, and was there fortunate in discovering two specimens of *Dasya punicea*, which appears to have been absent from our waters for some years. The shore of Torpoint, Plymouth, is very celebrated for receiving from its adjacent waters many very beautiful sea-weeds; amongst its number I last year found in some abundance the very pretty weed *Nitiphyllum Thysanorhizans*, some of the specimens in fruit. I also found it in the same locality in the year 1873, and in fruit, and the somewhat scarce plant *Dudrisina dudrisnagra* also came before me on the same shore.—*H. G.*

ASPLENIUM SEPTENTRIONALE.—I can confirm what your correspondent, Mr. Belt, says as to *Asplenium Septentrionale* being found near Dolgelly; my friend Mr. Rose, of Gorton, and I saw it growing there in the summer of 1874 (but sparingly), and we did not even bring a frond away.—*T. Brittain.*

SOLANUM DULCAMARA.—My impression, after reading a great many articles about this plant, is that the bulk of evidence points to the berries as being innocuous, or nearly so. In Pereira "Materia Medica" (edited by Bentley and Redwood), the following account of the properties of this plant is given:—"Physiological Effects, not very obvious. It is reputed to operate as a diaphoretic, diuretic, and demulcent, and in overdoses as an acro-narcotic; but many *have given the fruit* and preparations of the young branches *in very large doses*, without *any* obvious effects." The dried young branches are used in medicine, and used very seldom in comparison with other medicines. I can practically say that it is very rarely prescribed in this neighbourhood, and why? Because of its unobserved effects. The following is an extract from Bentley's "Botany":—"A fatal case of poisoning by the berries has occurred at Toulouse." Why do we not hear more of their toxicological effects, when so many of our damp hedges are so profusely adorned with their tempting berries?—*William West, Bradford.*

GEOLOGY.

GEOLOGY OF COLORADO AND THE ADJACENT TERRITORIES.—We have received a copy of the ninth annual report of the United States Geological and Geographical Survey of the above country, in

* I see the authority upon which *acaulis* figured in Smith's Botany is that of Mons. de St. Amans, who found it near Haverford-west, where, without doubt, it was a garden escape.

which is contained a copious report of the progress of the exploration for the year 1875, written by Dr. F. V. Hayden. The volume is attractive, although bulky, and is copiously illustrated by maps and sections. A zoological appendix furnishes us with the new discoveries concerning the wild animals and insects of the districts surveyed ; and this part is also abundantly illustrated with plates. The generosity of the United States Government in supplying foreign men of science with numerous copies of their scientific books is in strong contrast with the niggardliness with which our own Geological Survey publications are dribbled out.

THE SOLITAIRE.—In the *Annals and Magazine of Natural History*, Prof. Owen gives a lengthy description of this extinct bird, based on the remains brought home from the island of Rodriguez during the Venus Transit expedition. The Solitaire (*Pezophaps solitaria*, Strkl.) was a huge ground-dove, about three feet long, whose wings gradually became aborted until it could no longer fly. The absence of any extirpating enemies (until man appeared), and the presence of abundant food, enabled the Solitaire to acquire its great size.

THE GEOLOGISTS' ASSOCIATION.—Besides some well-written and profitable descriptions of several visits made by the members of this association to the Crag districts of Suffolk ; Grays, Essex ; Leicestershire ; to Caterham, Godstone, Tilburstow, Nutfield, Hampstead, Guildford, and Derbyshire, the last two parts of their "Proceedings" contain papers by the Rev. J. F. Blake, on "The Restoration of Extinct Animals"; "On the Geology of Leicestershire," by W. J. Harrison, F.G.S. ; "On the Flints of the Chalk of Yorkshire," by J. H. Mortimer, F.G.S. ; on "The Forms of the Genus *Micraster*," by C. Evans, F.G.S. ; the "Geology of the Eastern portion of the Banbury and Cheltenham Direct Railway," by T. Beesley, F.C.S., &c.

"FUR-BEARING ANIMALS" is the title of a monograph by Dr. Elliott Coues on the North American *Mustelidæ*, and is published as one of the United States Geological Survey works. It gives a detailed account of the Wolverine, the Martens or Sables, Ermine, Minx, and various other kinds of Weasels ; of several species of Skunks, of the Badger, Sea-otter, Land-otter, and allies of these animals. This compact and handy volume is illustrated with sixty figures on twenty plates. It is published by the Government Printing Office, Washington, U.S.

THE HUGE FOSSIL BIRD FROM SHEPPEY.—At a recent meeting of the Geological Society of London, Prof. Owen described some remains of a large bird obtained by Mr. W. H. Shrubsole from the London Clay of Sheppey, consisting of parts of fractured humeri belonging to the right and left sides of the same species, or perhaps individual, and including the head of the bone, with portions of the upper and lower parts of the shaft. The texture of the shaft. the thinness of its bony wall, and the large size of the cavity, recall the characters of the wing-bones of the large Cretaceous Pterodactyles. The author indicated the characters which led him to regard the remains under consideration as those of a volant bird, most nearly approaching the genera *Pelecanus* and *Diomedea ;* and as the evidence derived from the cranium of *Dasornis* would indicate a bird too large to be upborne by wings to which these bones might have belonged, whilst the skull of *Odontopteryx* is far too small to have formed part of a bird with wings as large as those of the Albatross,—and *Lithornis* and *Pelargornis* are excluded by the characters of their remains, the author concluded that the bones obtained by Mr. Shrubsole furnished indications of a new genus and species of flying birds, for which he proposed the name of *Argillornis longipennis*. He regarded it as probably a long-winged natatorial bird, most nearly related to *Diomedea*, but considerably exceeding the Albatross (*D. exulans*) in size.

GEOLOGICAL HISTORY OF THE DEER FAMILY.—At the same meeting Prof. Boyd Dawkins gave an outline of the history of Deer during the Miocene and Pliocene periods. He said the majority of known antlers could be referred to two types,—an earlier or *capreoline*, and a later or *axidine*. In the Middle Miocene period the cervine antler consisted of a simply forked crown. In the Upper Miocene it had become more complex. In the Pliocene it had become still more complex and complicated ; and in this respect the development of antlers in time represented that in age of the same individual. The nearest living analogue of the Miocene Deer is, according to the antler, the Muntjak (*Styloceros*), now found only in the oriental region of Asia, along with the Tapir, which also coexisted with *Cervus dicranoceros* in the Miocene forests of Germany. The Pliocene Deer, again, are generally most nearly allied to the oriental Axis and Rusa Deer, the only exception being *Cervus cusanus*, the antlers of which resemble those of the Roe, an animal widely spread over Europe and Northern and Central Asia. The alliance of these Pliocene Deer with those now living in the Indian region is regarded by the author as a further proof of the warm climate of Europe in Miocene times, confirmatory of the conclusions arrived at by Saporta from the study of the vegetation.

THE FOSSIL FUNGUS.—In the December number of the SCIENCE-GOSSIP is a reprint of a paper on a fossil fungus, in which Mr. G. W. Smith is represented as the discoverer. My knowledge of this particular fungus induces me to dispute his claim to its discovery. In the first place, the section from which he has sketched the figures to illustrate his paper came from my own cabinet. In the second place, I read a short paper before the Scientific

Students' Association, Manchester, during the session of 1874–5, on this fungus, which was identified by one of the members of that society as *Peronosporites.* No record of this discovery was made at the time, except in the minutes of the Society. After reading the above paper, I put a section of this fungus (among other sections), in the hands of my friend, Mr. Young, for his own cabinet, and he casually showed it to Mr. Carruthers and Mr. Smith, which resulted in Mr. Smith's paper. This is one instance among many of the necessity of more permanent record being made in some leading journal of the work of our country societies.—*John Butterworth, Goats Shaw, Oldham.*

NOTES AND QUERIES.

BRITISH SNAKES.—Is there any evidence of our English snake feeding upon birds or field-mice, or, indeed, anything but frogs and toads? I have kept many snakes (*Natrix torquata*), and have only twice seen them consent to swallow toads, and that was during very hot weather, when their appetite was excited by the high temperature of a melon-frame, in which they were kept. Most snakes (I am now referring only to our native species) will prefer starving to death, according to my observation and that of many of my friends, to partaking of any other food than frogs, though it is said in many books that they will eat mice and birds.—*A. R.*

VENOMOUS REPTILES OF IRELAND.—Can any reader of SCIENCE-GOSSIP give me information respecting the venomous reptiles of Ireland? Having explored the counties of Dublin and Wicklow, I was much struck at never coming across any such reptile, although in so many spots where one would expect to find them—ruins, river-banks covered with thick undergrowth, and deeply-secluded dells. Can any reader inform me if this is the case throughout the isle, or how to account for the lack in these parts? Has climate or soil anything to do with it (casting aside, of course, the popular legend of St. Kevin having banished them to Glendalough)?—*S. E. Bennett, St. Hildred's.*

PERTINACITY OF THE HAWK.—On the 30th of September last I was staying with the family of Colonel C., and, while they were at church, a hawk flew into Mrs. C.'s bedroom, attracted by her bulfinch and her linnet, each sunning itself in a separate cage. How long the intruder kept these poor birds in agonizing terror no one can precisely state; the maid, who first entered the room, chased the enemy away, and informed her lady of the unwelcome visitor. Mrs. C. rushed up-stairs to the cages of her pets, and found them both greatly disturbed: they approached her, and with eloquent eyes and various expressive gestures, made her understand how terribly they had been frightened by the appearance of a bird of prey. Nothing could prove this to a greater certainty than the loss of their feathers, which lay scattered in their cages. The bulfinch dropped nine feathers from his tail, and the linnet seven. These feathers were carefully wrapped up in silver paper and put into a box, as a memento of that Sunday. The wretched culprit flew to an opposite tree, where he was watched by the stablemen, till they saw him fly again into the tempting room, evidently determined to make a good Sunday's meal of the plump little birds, but there the villain met with his due. Somebody disturbed him, out he flew, and, clumsily, like a burglar who is caught in the fact, knocked himself against the window, blooded it all over, and disappeared, to be seen no more. The hawk could not have got to these birds, the wires were so close.—*E. A. W.*

QUERY AS TO WATERCRESS.—The plant referred to by Chateaubriand is the great water-radish (*Nasturtium amphibium*), a plant which increases rapidly by stolons. Sir James E. Smith ("English Flora," vol. iii. p. 195) writes: "This plant is noticed by the celebrated M. Chateaubriand in his account of England, for its wonderful powers of increase by the root. He observed it in the river near Beccles, where he long resided as an emigrant, and his rather florid description has excited wonder and curiosity in many who daily, perhaps, pass over, without regard, several no less interesting works of their Creator." I should doubt whether the peculiar method of progression described by M. Chateaubriand is the usual habit either of this or any other plant, and I have certainly never observed it myself, though I have long been familiar with this species of cress; nevertheless I have no doubt that M. Chateaubriand accurately related what he himself saw, as it is exactly what might very easily occur if the bottom were disturbed by an oar or punt-pole.—*F. V. P.*

CAVES IN SOMERSETSHIRE.—Can any readers of SCIENCE-GOSSIP give me any information as to the caves of Somersetshire, especially those of the Mendip range, in Barrington Combe? On an elevated spot, known as Dolbury Camp, there is a curious inclosure of fallen stones and earthworks, in the centre of which is a deep pit, of such a depth that one cannot from the mouth see the bottom. Can this have been a well for the garrison, or an artificial shaft for mining, or even a natural cave? Any information on this subject will be gratefully received, as I have ineffectually tried to gather explanation for some time past.—*Somersæta.*

A FELINE NURSE.—Calling at a farm-house the other day, I was told I was just a day too late to see a very wonderful sight—a cat nursing some little chicks. It appears the cat had a family of dead kittens a few days before, and the same morning some five or six chicks were hatched; as there were others to come out, the lady of the house took the just hatched chicks into the house till all were hatched, and placed them before the fire in the sitting-room, or, as we say here, the "keeping room." Pussy, greatly to the horror of the good lady of the house, took a great fancy to them, and could not be kept away from them. Wishing to see what would take place, the owner allowed her to come near, when she began to stroke them down with her paw in the most affectionate and tender manner, and, after a while, lying down, gathered them well under her. There she lay all the day; in the evening they were taken from her, but next day she did the same; but the third day, fearful of accidents, they were taken away from her and put under their proper mother, who had now hatched out her whole brood. I wonder what pussy would have done with them.—*Gobbs.*

ENTOMOLOGICAL AND BOTANICAL LOCALITIES.—Can any of your correspondents tell me exactly where the following places in Berks and Oxon are:—Shotover Hill, Winchwood Forest, Cowley, Cornbury Quarry, Sunninghill Wells, and Bagley Wood? I have seen it mentioned that various

insects and plants are to be found in these localities, and shall be obliged to any one who will give me the required information.—*H. Morton.*

NESTING OF MISSEL THRUSH.—Can any reader of SCIENCE-GOSSIP tell me whether it is rare or not for the Missel Thrush (*Turdus viscivorus*) to build its nest on the tops of walls? I found a nest in May, 1872, on the top of a wall,—it had four eggs in it, and the female was sitting on it; and another in May, 1876.—*Jas. Ingleby.*

BLACKBIRD AND THRUSH.—About the middle of April, hunting round the garden, I found a nest nearly finished, which I thought belonged to a blackbird, though I could not catch sight of the female bird. Two days after, looking into the nest, I found four eggs, all just like a blackbird's, except that one egg had the deep claret markings of a thrush: the female being still very wary, had flown away before I could see her. Two or three days after I again visited the nest, and found that the bird sitting was a thrush; she was then very tame, and, showing no signs of fear, let me watch her, standing within a few feet of her nest. The last week in April the eggs were hatched. I was unable to watch her again for about ten days, when, to my regret, I found that only one young bird remained; the old bird was then very restless, flying round and round her nest, but never going more than ten yards from it, and uttering incessantly a single low plaintive note. I had then ample opportunity of watching her, aud can state with certainty that it was a song-thrush (*Turdus musicus*). As soon as the young bird could fly at all, both the mother and her offspring disappeared. The blackbird was not nearly so assiduous in the welfare of the young one as its mate, and I cannot see why it should mate with a thrush when there are plenty of blackbirds all round us.—*G. T. B.*

BLACKBIRD OR THRUSH.—In the November number of SCIENCE-GOSSIP I saw a notice, by "G. T. B.," of Blackbird and Thrush. I have taken, at several places, nests built like a blackbird's, but at the top of a high fir generally (while blackbirds build near the ground), containing eggs like a thrush's, but instead of black spots, a few pale reddish ones. The nests were lined with hay, not mud, as a thrush's, surrounded outside with coarse pieces of stick and bits of fir or grass. I have never seen the old birds, but I have named them in my cabinet as produced by the mating of a blackbird and thrush.—*S. S. B., Bradford Abbas.*

BIRDS' EGGS.—In your number for September last a correspondent gives a few reasons for "birdnesting," which I think are open to the following objections. To take them in order:—1. Is it necessary that, to obtain a knowledge of the situation and materials of a bird's nest, the eggs need be taken? Would not a note, made on the spot, of the nest, its contents, position, &c., without disturbing the eggs, be more to the point? 2. With respect to the many people who take their only knowledge of ornithology from the robbing of nests, I may venture to assert that, as far as my knowledge goes, three out of four such collectors take little or no interest in the birds themselves; in some cases not even in the nest, the eggs being all they look or care for. And of how much value to science is the knowledge they thus acquire? 3. There is certainly a great difference between taking the eggs of domestic poultry and those of wild birds, for in the former, domestication seems to have almost eradicated their natural feelings (though even in them there is some trace left, as is shown by their sometimes concealing their eggs as much as possible, laying in out-of-the-way holes and corners), but that pain is thus given to wild birds, there can be no doubt, after one has heard the painful twitter of the parent-bird whose nest is disturbed. 4. That the taking of their eggs is necessary to keep the commoner species within bounds, I fail to see. In the first place, if there were any fear of their becoming too numerous, why should an Act of Parliament have been passed to check this "practice"? On the other hand, is there not a fear of causing the rarer species to become extinct, for it is on them that the brunt of this "practice" falls? How many are there, even of those who call themselves collectors, or oologists, who only take what rare eggs they really require for their own cabinets? How many resist the temptation to take all the very rare ones they find, when they are so easily exchanged, or when a friend would be so pleased to accept them? Of course there are some who do, but I am afraid they are sadly outnumbered by those who do not, as reference to your Exchange column any month will show. But those of the commoner kinds are neither saleable nor exchangeable, and therefore remain comparatively unmolested, except by the veritable nest-robber; and the rarer a bird becomes, the more are its eggs sought after. Another of your correspondents reminds Mr. Van Dyck that there is a law which prevents the shooting of many birds during the time of their stay with us. May I be allowed to remind *him* that there is also another, to prevent the robbing of their nests? As to the "fond remembrances of bygone days" on which he lays such stress, could not they be brought to the mind just as vividly by looking through the note-book, the companion of such rambles (he accuses Mr. Van Dyck of a crib: may I ask him if he has not read the paper on "Birds' Eggs" in "Notes On Collecting and Preserving Natural History Objects"?), and would not the pleasure of searching out the nest be rather heightened than otherwise by leaving the eggs; for he is hard-hearted indeed in whom the plaintive notes of the mother-bird raise no touch of feeling akin to remorse? Then we are told that after a "few years'" earnest collecting (it would be interesting to know how many eggs are usually destroyed in a few such years) most "collectors" are able to give "not only the name of the bird," but an account of its habits, &c., with a "number of interesting facts"; but, as before mentioned, I fail to see that it is at all necessary to rob the nest of its eggs to obtain a knowledge of these "interesting facts," and if it were, to use a French expression, is "the game worth the candle"? In short, I do not see that in ninety cases out of a hundred any object is gained by breaking the laws of the land in this particular, and cordially agree with the Editor in wishing that all Natural History societies would follow the good example set by the Woolhope Club. —*L. W. G.*

SINGULAR AFFECTION OF A HEN.—We had a hen, of the barndoor or common fowl breed, say about two years old, which we purchased, with another from the same brood, from a farmer in this neighbourhood some months ago. It was observed that the hen's eyesight was dim when we first had her, but after a few weeks the sight seemed to leave her altogether, and of course total blindness followed. The fowl was fed by placing her food immediately under or close to her, and she picked up sufficient to sustain life. The other fowls seemed to take exception at the blind hen's company, and each one, with one exception, constantly attacked her. The curious part of the thing was, that the sister of the blind

hen (previously mentioned) had chickens, and as soon as she returned at night with her young brood (four), the blind hen was called by the sister, and shared the protection with the little chicks, *i.e.* under the wing of their mother. This continued for two or three weeks, or until some ten days ago, when a carrion crow, while making a predatory visit to the precincts of the farm, observed the helpless condition of our blind pet, and made an attack upon her, and before any assistance could be rendered, killed and devoured nearly the whole of the body. We, as you may imagine, were full of sorrow for our loss.—*P. Donaldson, Goytrey, Monmouthshire.*

"FAIRY-FLAX."—In the September number of SCIENCE-GOSSIP, No. 153, p. 194, Mr. Robert Holland speaks of the amazing undergrowth of fairy-flax. What plant is known under this name?—*E. L. R.*

PREDATORY SLUG.—This may have been *Testacella haliotoidea*, a species known to live on earthworms; but usually subterranean in its habits. It may easily be distinguished from the common slugs by the following characters: the body increases in size like that of a leech, from the head to the posterior end, which terminates abruptly; and bears a small external shell; it is very tough, and of a yellow-grey colour, with grooved lines along the side of the body. The common slugs, *Limax* and *Arion*, are, however, not only carnivorous, but cannibals. After slaughtering one of these garden pests, I have often found in the evening two or three more feasting on the body of their late comrade. Slugs and snails, as Mr. Slater remarks, seem to be unaffected by vegetable poisons; indeed, the poisonous *Solanaceæ*, as *Atropa Belladonna*, seem specially attractive to them. This, however, is less remarkable when we remember that the rabbit, an animal much higher in the scale of life than the snail, can eat any quantity of Belladonna with impunity.—*H. F. Parsons.*

IS THE LEMMING FOUND IN ENGLAND?—Is it not very likely that the holes referred to, under this heading in SCIENCE-GOSSIP, No. 152, p. 189, were made by the common Shrew (*Sorex araneus*, Bell), which it is well known makes large superficial burrows in the earth? The fact of its being on such high ground is probably accounted for by the increase of its great enemy, man, in the valleys below. The size of their burrows would be about an inch in diameter.—*S. T.*

FRUCTIFICATION OF SYCAMORE (No. 155, p. 257).—Mr. W. E. Green has, I think, scarcely appreciated my difficulty in accounting for the increased number of winged seeds in so many sycamore fruits. With us in the north, although sycamores, hollies, nuts, and some few other trees and shrubs have produced large quantities of fruit, it has decidedly been an unfruitful year. We have had no apples, pears, or plums, and very few cherries; no acorns, very few ash-keys, and scarcely any haws; therefore, I do not think the phenomenon can be accounted for by supposing that the season has been a particularly fruitful one, which really means that the weather was suitable, or the insects numerous enough during flower-time for the fertilization of *existing* germs, or sunny enough for the full and perfect development of fertilized germs. If sycamore flowers usually contained several pistils, one only, as in the Nut, coming to maturity, or even the *rudiments* of several pistils, one could readily understand that congenial weather might cause those already existing, though rudimentary organs, to be developed and to reach maturity; but this is not the case. The flower of the sycamore does not contain, under ordinary circumstances, even the rudiments of several pistils. No doubt, as Mr. Green suggests, an unusually mild winter might cause great changes in the growth of plants, but the tendency of a mild winter is to produce rather a scanty crop, partly by the blossom opening too soon, and partly by the time of rest for the tree not being sufficiently prolonged; and I suspect the cause is more remote. The weather of the present year could hardly have caused the formation of new organs; the mildness of last winter may have had some peculiar effect, but it is perhaps more probable, if weather has had anything to do with it, that there was some specially congenial weather during the summer or autumn of 1876 which induced such a complete ripening of the wood that it caused the sycamore-trees to start with unusual vigour in the spring of this year, and that organs were thereby produced which, had the trees been somewhat less vigorous, would have been entirely suppressed.—*Robert Holland, Norton Hill, Runcorn.*

THE TYRIAN DYE.—Your correspondent "B." (see No. 155, p. 260) is evidently unaware that this celebrated dye was of a *crimson* hue, or he would not have imagined that it might have been extracted from *Leptoclinium punctatum*, "because when put into water, it (*L. punctatum*) stained the water of a *blue* colour." The word *purpureus*, whence the English *purple*, signifies "bright red," as *Digitalis purpurea*, the Foxglove. The present corrupt use of the word purple to signify a shade of blue is quite recent. Has "B." never read Izaak Walton's lines on fishing, in which he mentions the common perch, with its "fins of Tyrian dye"?—*W. R. Tate, Blandford, Dorset.*

A CURIOSITY.—I have in my possession a Hindoo or Burmese sword-handle made from an elephant's tusk, on which, after the Eastern fashion, many quaint and curious figures are carved: men with grotesque and hideous faces disfigured with elephants' trunks, crocodiles' mouths, monkeys' heads, and the like. Among these forms, but separated from the rest, is carved a tiger or bear, I am not sure which, but think the latter: in its mouth it holds a fish. Now, I should very much like to ascertain if this has been carved among its fellow-anomalies as a prodigy that has been said to have existed, but which the executor, desiring to ridicule, placed among his monstrosities. South American travellers of good repute tell tales of the common jaguar (*Leopardus Onca*) hanging over the banks of streams, and catching the unwary fish that chance to pass by. Is it on record that any member of the Felidæ or Isabellæ of the old world ever performed the same feat?—*Daccart Aikone.*

SUDDEN CHANGE IN COLOUR OF THE HUMAN HAIR.—"Is it possible for a person's hair to turn white in a short time?" There are so many instances now on record, that there ought to be no longer any doubt upon the subject. In the late Arctic expedition nearly every man's hair became greyer, and in some cases white, but assumed its natural colour when the men returned to lower latitudes. In many cases the human hair is said to have turned grey from grief, extreme care, or sudden fright. My experience is very small, but nevertheless may be interesting to some of the readers of SCIENCE-GOSSIP. During an outward passage to Australia, the ship I was in suffered greatly in the British Channel; twice we were nearly wrecked, having lost three anchors and two cables. The pilot who had charge was constantly on watch, only snatching a few minutes' sleep here and there, as opportunity afforded. On the whole, he had a very anxious time indeed, and when he eventually left the ship off the Isle of Wight he

certainly looked twenty years older. I thought his hair had decidedly turned greyer: this may, however, have been only imagination, and therefore ought rather to be considered as an impression than actual fact. Within the last few months a fresh case of the possibility of the colour of hair changing has come under my notice. An old gentleman, aged eighty-nine, residing in my immediate neighbourhood, lately died. For many years his hair had been perfectly white, but a few days before his death some of his hair became black, giving the appearance of his having dark brown or black hair. Here it is interesting to note that in his younger days his hair was light. After the death of this gentleman the tips of the hair for about an inch assumed the original colour, becoming white again. Has a similar case fallen under the notice of any of your readers? I have heard of another instance, where after death the hair turned from white to black. Dogs seem to be affected with regard to their hair in like manner as human beings. I lately read of a case where a black Newfoundland dog became grey in a few weeks; and the writer declares that the only cause for this sudden change was grief.—*C. P. Ogilvie.*

Mistletoe, Apple, and Pear.—Does not the fact mentioned by Mr. C. H. Westley, that mistletoe does not grow commonly, if at all, on the pear, open up some interesting questions? I believe I am correct in saying that, though the apple and the pear can each of them be grafted on a variety of stocks, amongst others on some but remotely related to them, neither can be grafted on the other. The growth of the mistletoe is a kind of natural grafting, and occurs on trees belonging to several widely different orders; yet it seems to be confined to one of these two allied species. May there not be some underlying physiological identity between the various possible stocks, some physiological difference between apple and pear? Has any one ever attempted to graft apple or soecies ther on mistletoe? Will mistletoe grow on all stocks used for apples, or on any used for pears? —*G. S. Boulger.*

Mistletoe.—Bentley mentions *Viscum album* as parasitic on thorns and willows? Can your readers tell me whether it is commonly found on these? also whether *Prunus spinosa* is the plant meant by thorns?—*J. J. W. S.*

Watercresses.—The following extract may perhaps be of interest to some of your readers. At the meeting of the Royal Horticultural Society on Tuesday, Mr. Shirley Hibberd, of Stoke Newington, presented a dozen pans of watercresses, grown in the manner he has practised for some years past. One of the advantages of this system is, that the plants are under complete control to be placed in the sun or the shade, or during winter in heated plant-houses, and can at all times be supplied with pure water, and thus be preserved from contamination by the pollutions common to rivers, and even to watercress-beds. The pans in which they are grown measure from 15 inches to 20 inches across, and from 6 inches to 9 inches deep. They are filled with rich loamy soil, intermixed with lumps of chalk or old mortar, and then very small cuttings are inserted. These soon become strong plants, and in from fifteen to twenty days may be gathered from, the cresses being tender and delicate in flavour, and of the most beautiful appearance. The twelve plants shown have been regularly cut for the table for a period of six weeks, and their fresh and robust appearance indicated that gatherings might be had from them for another six weeks without their being exhausted. The sorts shown were the Erfurt sweet green cress, the Springhead brown cress, and the Stoke Newington purple cress. The adjudicators signified their approval of this mode of cultivation by the award of a medal to Mr. Hibberd. —*H. Budge.*

Query respecting Sea Anemones.—Will a correspondent kindly give a little information respecting Sea Anemones: should they be fed, and if so, how often, and about in what quantity?—*W. T. H. C. Trome.*

Swans and Rats.—Some time since I noticed some rats had taken possession of a hollow tree growing by the side of my mill dam, and not wishing to retain them there as tenants, I suggested to one of my servants the propriety of serving them with "notice to quit," and to this end I enlisted the services of a ferret. Very soon two or three of the family leaped into the water. A pair of swans were close by watching our movements, and no sooner did the rats attempt to swim across the dam, than the swans at once gave chase to the enemy; more than once they seized the rats and threw them above the water, and as often as they raised their heads, the swans, regardless of the presence of spectators, pursued their enemy to their bitter end, and by frequently pecking at them eventually succeeded in drowning them, as was proved by the dead bodies floating down to the mill ruck a few minutes after the battle.—*R. Cooke, Glanford Mill, Norfolk.*

Spectral Phenomena.—Two curious phenomena have lately come to my knowledge in conversation with friends who were eye-witnesses of them. Perhaps some of your readers may be interested enough to endeavour to throw some light upon them. A gentleman was parting with a friend on Hampstead Heath, one night about eight years ago, the moon and stars shining, when they both observed what appeared like *three bright bars* stretching across the sky about midway between the zenith and horizon towards the west, and apparently also twenty or thirty yards in length, and remaining so for over half an hour. A lady walking along the Euston road when the sun was shining brightly, saw in the air before her a *gigantic semaphore*. Upon reaching one of the stations of the Metropolitan Railway, a real semaphore was noticed to correspond in position with the spectre.—*R. H. A. B.*

The Lunar Bow.—I observed this remarkable phenomenon on November 22nd under very favourable circumstances. At about 8.25 P.M. the moon was shining very brightly, and on looking towards the western sky, I perceived a faintly-coloured bow spanning the heavens and extending some distance across the distant landscape. The colours were pale and indistinct, but the general form of the bow was very definitely marked.—*George Clinch, West Wickham, Kent.*

Lapwing and Sparrow-hawk.—I am not much surprised at the communication of J. C. Stephens, No. 155, p. 262, in which he states that he "observed a lapwing or peewit pursuing a sparrow-hawk." I believe that, under certain circumstances, that bird will attack, or at least chase and attempt to frighten, any bird whatever that approaches the ground where it has taken up its abode. As a proof of this I will mention what came under my own observation during the past spring. In a field of about twelve acres in extent adjoining my residence, two lapwings took up their abode. There are some rookeries at a short distance from this, and on several occasions the colonies came into this and the adjoining fields to

forage. For some time the lapwings paid little attention to the crows, but ultimately the female commenced to hatch her eggs, and then a real warfare began with the male. No sooner did the crows, generally two or three hundred, alight in the field where the female was sitting, than the male commenced a most determined attack on them. It darted towards them with the rapidity and vigour of a hawk, but evidently with the sole intention of banishing them from the field, as I could never notice that it came actually in contact with them, but always so near as to render them uncomfortable. Those who have observed a lapwing under these conditions will be aware of the peculiarly loud noise that it has the power of producing with its wings, and this, no doubt, has its effect upon the birds that approach its domain. This was the case in the present instance. Not a moment's quietude was allowed the crows until the whole colony was banished from the field, and they were obliged to betake themselves to the neighbouring grounds, where they could follow their occupation in peace. Not more than a few minutes elapsed until the lapwing had cleared the field of the intruders. I witnessed cases of this kind repeatedly, and always with the same effect. This faithful sentinel of its mate would allow no bird whatever to enter this field without attempting to banish it. These attacks of the lapwing were not confined to birds alone, but also to human beings. If any person happened to pass through this field, and more especially when near the nest of the female, the male immediately darted past him on all sides, and so contiguous that it might almost be touched, making the peculiarly loud noise with its wings. Thus it continued without intermission until the intruder had left the field. On one occasion I was greatly amused with a crow that it took prisoner. The crow alighted in the field near a tree, but the moment it did so the lapwing commenced its usual attack by darting close past it (on no occasion did I see it come fairly in contact with the intruder), and the crow to avoid it took refuge in the tree. The lapwing then soared away for a short distance, but never out of sight of the crow, and the latter, no doubt thinking that its enemy had disappeared, left the tree and again began to forage in the field. But this was only momentary. The lapwing was quite aware of the fact, and down again it pounced on the crow, which, as before, took shelter in the tree. This state of things continued more than a dozen times, until at last the crow, finding that neither peace nor profit could be obtained there, contrived to steal from the tree, and took its departure to some other locality, where it might forage in peace and quietness. The courageous and faithful guardian, however, at last came to an untimely end. I did not witness this myself, but was told by a game-watcher who did, and therefore cannot say whether the hawk which killed it did so without provocation, or that the latter had been annoyed by the usual attack of the lapwing to banish it from the field. However, the lapwing was struck to the ground by the hawk, and the game-watcher, thinking that he might be able to save its life, went to its rescue with all speed, but on reaching it found that the hawk had torn its head off. Since that time I have never seen the female, nor any of its young—if it succeeded in hatching them,—and the crows may now be seen daily foraging in the field without interruption.—*Dipton Burn.*

THE BETULARIA AND ITS VARIETIES.—In the month of June, 1874, I was proceeding on the outside of an omnibus from Middleton to Manchester in company with a brother entomologist, when I thought I observed a large specimen of the *Betularia* in a plantation in the neighbourhood of Heaton Park, on the left-hand side of the high road. The driver of the 'bus, noting my anxiety to capture the specimen, very kindly promised to proceed slowly for a short distance, so as to give me an opportunity of seeing whether my impressions were right or not with regard to what I had seen. I soon reached the plantation, near the entrance to which, to my great joy and surprise, I found a large female *Betularia* of the buff variety on a tree, in conjunction with a black male. I picked them off the tree and returned to the 'bus, several of the passengers being astonished when I told them the value of my prize. Not being prepared with a box at the time, I allowed my captures to creep on my clothes, but after we had gone some distance I set the black one free, to the evident surprise of the passengers, who seemed to think that the more valuable of the two. However, on arriving at Cheetham Hill, my entomological friend procured a large-sized pill-box, and into this I placed the buff specimen. We proceeded to Belle-Vue Gardens, to spend the afternoon, though I will confess that the pleasure I experienced there received additional zest from the discovery and capture I had made during the afternoon. On arriving home I was sorry to find the specimen in a somewhat sorry condition, the box in which I had confined it having been rather too small. Fortunately I succeeded in restoring it, and I afterwards reared about 120 specimens, but, singular to say, and to my great disappointment, the buff variety did not make its appearance. At this time a friend of mine had some of the black variety, and he was kind enough to give me a few; so I crossed them, but with the same result. Still I had faith that they must have some of their parent's buff qualities in them, and I made another attempt to breed them. The result, I am glad to say, was very gratifying indeed. On the 4th of December last I placed about fifty of the pupæ in a box; for, being very eager to see the buff variety come forth, I resolved to try what artificial means would do. Impelled by curiosity, I, on the 4th of January this year, took a peep into the box, when, to my great delight, I found that one of the buff variety had emerged from the pupa. I followed up my success, and have succeeded in obtaining about one buff one out of twenty of the whole brood, some of them being all buff, and others very variable, both in their colour and markings. The foregoing information, therefore, makes me feel confident of having established two distinct varieties of *Betularia* from a domestic point of view, and possibly what I have stated may be of value to entomology, and to those who love the science.—*Thomas Lomas.*

A FIGHT WITH AN EAGLE.—The *Dagbladet*, a Danish newspaper, for July 10th, 1876, gives the following account of a rare incident which occurred on the previous Wednesday evening upon Rövling Heath, in the district of Aalborg, Jutland. Two girls, eight and twelve years of age, having been sent by their parents to fetch home the cows from the heath, were attacked, while returning, by a very large eagle, which made several attempts to swoop down, but was deterred by the elder girl swinging a tethering mallet over her head till she could procure some stones; these she hurled against her powerful antagonist, and was at last so fortunate as to strike it with such effect that it fell dead. It measured from tip to tip of its extended wings, six feet eight inches ($3\frac{1}{4}$ alen), and weighed about ten pounds (9 pund). Its largest claws were from an inch and a half to two inches long; its colour was intermingled grey and white.—*J. Wager.*

COLIAS EDUSA AND ITS VARIETIES.—At the time my few notes on this interesting butterfly were written, which appeared in SCIENCE-GOSSIP, No. 156, p. 280, I considered myself fortunate in securing *two* of the white varieties, having collected thirteen or fourteen years, and being obliged till this year to put up with one tattered English and a foreign representative. Since then, however, my brother and I have captured forty-five Helice, forty of which were taken in one field close to this town. The specimens exhibit much variety in colour, some being a rich cream and primrose, others a greenish white; in the size of the marginal spots there is also great difference; in some they are reduced to a minimum. —*Joseph Anderson, Junior, Chichester.*

DESTROYING MITES. — Your correspondent, "A. F." will, I think, find no difficulty in ridding his collection of mites, if he will adopt the following plan, which I have never known to fail. It is simply to dip a camel-hair brush into benzine, and let the fluid fall upon the insect drop by drop until it is completely saturated; the little heaps of dust which usually betokens the presence of mites underneath the specimens can be wiped up with the brush. On account of the extremely volatile nature of benzine, it is not of much use as a preventive for this purpose; it is better to employ plenty of camphor, or cotton wool soaked with a solution of carbolic acid. With even ordinary care mites need never be permitted to do any serious mischief, and no better piece of advice for their prevention can be given than that by Dr. Knaggs, to put into quarantine every insect we receive.—*Joseph Anderson, Junior, Chichester.*

DESTROYING MITES.—Many years since I left two cabinets of lepidoptera in the country for some twelve months, and on bringing them home found the bodies of many of the specimens eaten, and the mites travelling over the drawers in large numbers. I made a saturated solution of camphor in rectified spirit of wine, poured about a teaspoonful in one corner of each drawer, and by tilting, caused the liquid to flow round the angles; I then closed the cabinets, and on opening them a few days after found all life extinct. If "A. F." has not a compartment in each drawer for camphor, he should procure some muslin bags about two inches by one inch and a quarter, put a lump of camphor in each, and fix one in a corner of every drawer by a pin at both ends, renewing the camphor as often as it evaporates. By this means he may preserve his collection from injury by mites for any period.—*D. S.*

THE SUN AND THE EARTH.—I have the following figures before me of the distance between us and the sun. Taking Guyot's mean diameter of the earth, giving a radius of 3,938 miles—

Laplace gives a distance of miles		=92,636,990
The *Quarterly Review*, July, 1875, note, p. 209		=91,000,000
The *Academy*, 20th October, 1877, p. 389		=93,000,000
The *Mail*, 19th December, 1877, in a letter from Mr. Proctor	Tupman	=93,321,000
	Newcomb	=92,393,000

Mr. Proctor suggests that this measure is untrustworthy, as long as we get warmth and light, the actual distance of the sun is of little consequence; but what are the precise sciences to do? Newcomb and Laplace are as near the mark as we can hope for; but how is it that the precise sciences reach their conclusion as to the size of this world from the Nebular hypothesis of Laplace, without adopting his measure of distance between the earth and the sun? I find the figures for Laplace in his translation by J. Pond, p. 24, 1809. Will some one kindly tell us which distance is right?—*H. P. M.*

REASONING POWER OF DOGS.—Having witnessed the following occurrence some years ago, I could not help being struck with the great reasoning powers displayed by a dog. I lived in the town of N——, and the back of our terrace had small gardens, separated from each other by a short fence. One windy morning the clothes were drying on the line, and the dog (a fine retriever) was sporting itself on the grass, when a sudden gust blew the "things" on the ground; the dog at once ran into the house, and by sundry barks and pulls at her dress, induced the girl to go into the garden, where she discovered the cause of the dog's uneasiness. The next day being the "week's wash" of our neighbour, the clothes were airing in the garden, when our dog rushed into the house, and presently brought out the servant, who found that the prop had given way, and the "wash" was all on the ground.—*J. D.*

SUPERSTITIOUS DISLIKE TO THE WREN (*Troglodytes Europæus*).—This little bird, though generally a favourite, is in some rural districts regarded by the uneducated with the bitterest aversion, while its relative, the Redbreast, is considered sacred from all molestation. So deeply seated is this hatred to the Wren, that its nest is often ruthlessly torn away, and both nest and its contents trampled under foot. The only explanation which these good folks will vouchsafe, is that the "*wran*" is the *devil's* bird, and should therefore get no quarter. This strange superstition has, I believe, had its origin in one of the many myths which have been handed down from generation to generation, and received as truth beyond question. The legendary account of how the Robin got her red-breast is widely spread, both in Ireland and England, and no one in this country will molest the "poor robin," because his name is associated with our Lord; but the Wren has the misfortune of being associated with the sacred history in an unfavourable light: hence the odium which hangs around him. In the south of Ireland it appears this unkindly feeling does not exist, which is shown by a curious practice which existed at no very distant date in Cork. On St. Stephen's day a number of young men, in holiday dress, paraded the city, carrying a furze-bush, in which a wren was secured. As they stopped before the house, one of their number recited the following lines—

> "The wren, the wren, the king of all birds,
> Was caught St. Stephen's day in the furze;
> Although he's little, his family's great,
> Then pray, kind gentle folks, give him a *trate*."

It is to be hoped that this cruel and unmeaning dislike to a little bird of which poets have so sweetly sung, and naturalists so interestingly written, may ere long be swept away by advancing education.—*H. Allingham, Ballyshannon.*

HAREBELL (*Campanula rotundifolia*).—The English name, we are told, was bestowed upon it because it grows in the dry and hilly pastures frequented by the *hare*, but we would suggest, at least, an alternative derivation—or rather the plant itself suggests it—as to whether it may not have originally been named *hair bell* from the extremely light and delicate stems from which the blossoms hang. Another plant, equally light and delicate, is named the maiden-*hair*. I have extracted the above from p. 78, part 10, of "Familiar Wild Flowers," to which I refer Mr. Tate for an interesting article on the plant.—*T.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers. — As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

Fresh Chara.—A correspondent asks our good offices to obtain for him "a little fresh *Chara.*" Will our botanical friends, who can obtain it, send us a small supply?

W. Patrick.—You can purchase *Anodons* of R. Damon, F.G.S., Weymouth.

A. F. Fischer.—You cannot do better than preserve the chrysalis in the earth of a flower-pot. Put the latter *out of doors.* It will soon cease "wriggling." Out of doors is their natural condition of hybernation.

W. H. Legge.—The caterpillar of which you sent us a coloured drawing, is that of the well-known Pale Tussock-moth. The caterpillar goes by the name of the "Hop-dog" (*Orgyia pudibunda*).

E. M. (Saddleworth).—The specimens sent us from the turf-pits are flint chips, and seem to us to be the result of human handiwork. This appears all the more probable from the fact that *flint* is a very rare mineral, even in the drift beds, in your district. Can you send us some *larger* specimens for inspection?

W. H. S. (Colchester).—We shall feel obliged if you will send us some of the insects which demolish the "black beetles," as we cannot identify them from your description.

W. S. Wakefield.—The plant sent us is *Veronica Hendersonii.*

F. Coleman.—We have heard of no other instance of non-fulfilment except your own.

J. A. Sandford (Ohio).—Accept our thanks for specimens of *Apocynum androsæmifolium.*

C. W. H.—There is no fear whatever of the ants doing your Deodaras any harm.

Colonel M.—You had best have Science-Gossip sent to you direct from the publishers. The small crystals are carbonate of lime.

F. R. B.—We cannot, of course, tell you the name of the species of mussel without seeing specimens. But there is no doubt that the deposit in question is a post-glacial one, of the same age as our raised beeches.

F. Q.—You had best consult Whitaker's "Geology of the London Basin," published by Her Majesty's Stationery Office, for details of and references to the various sections of the Woolwich beds exhibited in the neighbourhood of London.

S. C. M.—Sach's "Botany," translated and edited by A. W. Bennett and Professor Dyer, and published by the Clarendon Press, gives the best account of the laws of vegetable growth and development.

A. M. (Wandsworth).—The crustacean, of which you sent us a drawing is *Idotea tricuspidata.*

J. Ransom.—We have no doubt that Mr. Bartlett, the Superintendent of the Zoological Gardens, would give you all the necessary information respecting the management of Marmosets.

T. C. M.—We have referred to the MS. of your "Exchange" in the January number, and find that we printed it *exactly* as you wrote it!

R. T. Andrews.—The "glass-like substance" you sent us is *Selenite*, or crystallized sulphate of lime; very likely from the London Clay formation.

J. Cunnack.—Your written description of the Hawk answers best to that of the common Buzzard (*Buteo vulgaris*).

W. K. and Others.—Your specimens have been forwarded to competent authorities to be named, and their names will appear in these columns as soon as we have received them.

E. R. F.—Potton, in Bedfordshire, is situated on the Lower Greensand formation, and the fossils you mention are, no doubt, from that deposit.

W. B. wishes for the address of the South London Entomological Society, as it has removed from its old quarters. We shall always be glad to chronicle such changes of removal.

C. Harris.—Many thanks for the specimens, which are very interesting. But we cannot undertake to name zoophytes from the Cape of Good Hope, or any other place where the fauna has not been scientifically worked and described.

EXCHANGES.

Wanted, British examples of *Vertigo angustior, V. alpestris*, and *Acme lineata.* Will give a liberal exchange in American land and freshwater shells.—G. Sherriff Tye, 62, Villa-road, Handsworth, Staffordshire.

Wanted, Microscopical Dictionary (old or new edition), in exchange for foreign insects, chiefly parasites, mounted or unmounted.—Address, M., Anglesea Lodge, Godalming, Surrey.

I would like to exchange U.S. Coleoptera for British or Foreign. Eggs in exchange for Coleoptera, if desired.—Address, Geo. J. Angell, 64, Elliott-place, Brooklyn, New York, U.S.

Wanted, *Fresh* specimens of any Cuttlefish or Squids. Offered in exchange, shells, insects, microscopic slides, scientific books, or money.—W. Cash, 38, Elmfield-terrace, Halifax.

A Few well-mounted micro slides to exchange—Lists to T. Shripton, The Terrace, Chesterfield.

Many species of British marine, land, and freshwater shells—offered in exchange for land shells from New Zealand, South America, Madagascar, and South Australia.—F. M. Hele, Fairlight, Elmgrove-road, Cotham, Bristol.

For unmounted or mounted diatoms will be sent some cleaned diatom Coccones Placentula, or Foraminifera from Spain: also, river mud from Lagos, for any object of interest for microscope.—A. Smith, 198, Essex-road, London.

For Tripoli, composed of diatoms, send well-mounted slide in exchange.

In exchange for any other mounted objects: Proboscis of Blow-fly, *Pleurosigma angulatum, Amphipleura pellucida.*

To French Marine Botanists. Wanted, in exchange for British sea-weeds, those of French growth.—H. G., 15, Mulgrave-street, Plymouth.

Exchange microscopical slides of different stages of the Pentacrinite larva of Comatula, various species of Marine Polyzoa, with their tentacles exerted, Australian seaweeds, &c. (list forwarded on application), for other thoroughly well-mounted slides. Illustrations of animal and vegetable structures preferred.—Adolph Leipner, 47, Hampton Park, Cotham, Bristol.

Several sets of six-opaque sections of coal plants and tissues; wanted, recent and fossil polyzoa, graptolites from Silurian strata, or vegetable preparations. Several sets of six recent and fossil foraminifera; wanted foraminiferous material, soundings, dredgings, or unwashed Lias clay.—G. R. Vine, Attercliffe, Sheffield.

Duplicates. — *Rhamni, Edusa, Cardamines, Ægeria, Semele, Atalanta, Cardui, Io, Paphia, Galathea, Quercus, Xanchographa, Desiderata, W. Album, Betulæ, Pruni, Paniscus, Atropos*, the *Sesiidæ*; many *Noctuæ* and *Geometræ.*—A. Dent, 20, Thurloe Square, London, S.W.

A large number of leaves with stellate hairs *in situ* from all parts of the world, in exchange for other good microscopic objects.—H. L., 6, Upper Phillimore Gardens, Kensington, W.

Wanted, *Erythræa latifolia*, other plants in exchange.—Rev. F. H. Arnold, Fishbourne, Chichester.

Send 2 good slides for 1 dozen patent mounting clips, brass, new kind, and capital to work with.—W. Tylar, 165, Well-street, Hockley, Birmingham.

Exchange or otherwise.—A Ross's $\frac{1}{10}$ in. object-glass—wet and dry—a useful glass. — Apply to Rev. S. Bramhall, St. John's Vicarage, Lynn.

Lyell's "Principles of Geology," 4 vols., boards, 1834, Figuier's "Primitive Man" (quite new), will exchange for British Birds' Eggs, or well-mounted British wild plants or mosses.—J. R. Murdoch, Horsforth, near Leeds.

BOOKS, &c., RECEIVED.

"Elementary Botany," Part II. By W. Bland. London: Bemrose & Sons.
"Industrial Art." January.
"Popular Science Review." January.
"The Midland Naturalist." January.
"Land and Water." January.
"The Naturalist." January.
"American Journal of Microscopy." December.
"Canadian Journal of Entomology." December.
"Potter's American Monthly." December.
"Boston Journal of Chemistry." December.
"Journal of Applied Sciences." January.
"Ben. Brierley's Journal." January.
"Chambers's Journal." January.
&c. &c. &c.

Communications have been received up to the 7th ult., from:—T. S.—T. B. W.—T. L.—G. C.—Dr. R. C. R.—G. S. T.—C. F. G.—W. B.—H. P. M.—A. M.—D. A.—W. H. P.—W. H. S.—G. S. B.—Mrs. B.—D. S.—J. A. jun.—C. V. S.—G. C. D.—G. P.—A. R.—J. D.—C. P. O.—W. B. G.—G. A. H.—W. W.—S. E. B.—H. C. D.—R. C.—P. D.—H. A.—W. C.—G. J. A.—T. S.—J. S. L.—W. J. F.—T. B.—M. K.—J. G.—A. C. C.—A. S.—C. C. H.—A. D. M.—W. J. S.—T. C. M.—J. C.—A. S.—R. T. A.—F. N. H.—J. H.—W. R. T.—Dr. B.—W. S. B.—J. B.—W. B.—C. E. B. H.—M. L.—J. B.—J. W.—W. T.—W. W.—G. L.—G. C.—G. E. B.—H. L.—H. P.—A. L—G. R. V.—A. D.—C. H.—J. R. M.—H. E. W.—W. M.—J. B.—C. B. M.—T. B.—A. W.—R. S.—T. F. U.—H. A. A.—R. G. C.—Dr. F. C. C.—W. K.—E. R. F.—J. B.—W. B.—H. G.—C. D.—&c. &c.

THE FLORA OF NATAL.

BY J. M. WOOD.

AS possibly some of your readers may feel interested in a few notes on the flora of this part of the world, I will, with your permission, enumerate a few of the native plants at present growing in my garden. I reside about twelve miles from the sea, and though my garden is neither extensive nor particularly well kept, still I have taken pleasure in adding to it some of our beautiful native plants, a number of which were already growing in it when I came to reside here, having been planted by a former occupant. The first plant which attracts the eye at this season is *Greya Sutherlandi*, a shrub or small tree, now covered with its beautiful scarlet flowers, though the leaves have hardly yet made their appearance; it is a sapindaceous plant, though its true position appears to be doubtful, and is a native of the higher districts of the colony, in the Drakensberg, a range of mountains on the border of the colony. I am told that its spikes of flowers are sometimes a foot or more in length. Here it is usually called the "Natal Bottle Brush," but it is rarely seen in cultivation, as, on the coast, at least, it does not succeed well. Close beside it is *Crinum Capense*, usually called in the colony the "Natal Lily," and everywhere found in profusion, from the coast to far inland; and in the spring and early summer producing its corymb of pink and white bell-shaped flowers. Near this plant is an *Arum*, of the genus *Richardia* (known here as the "Lily of the Nile"); it is now out of flower, but in the season flowering freely without the slightest care or attention. On the opposite side of the walk is another *Arum* of the same genus, whose leaves are spotted with white, like a *Caladium*, and which has a primrose or yellow spathe, and which is in this district quite plentiful. Beyond this plant, and scrambling about amongst the adjacent shrubs, is a species of *Mesembryanthemum*, with small but richly-coloured deep magenta flowers; and near it another species with larger white flowers, and which is in some places near here quite common. In the middle of a small grass-plot in front of the house are two plants of *Encephalartus*, a *cycadaceous* plant, which sometimes has a caudex 10 feet or more high; one of these plants, though its stem is only about 18 inches high, has produced three large cones in the centre of the crown of leaves or fronds, something like overgrown pine-apples. It is, I think, a male plant, though the scales are not yet sufficiently separated to decide with certainty; during the five years that I have observed the growth of these plants, they do not seem to have increased much in height, but as they only put forth one crown of leaves in each season, this is not to be wondered at. The largest plant has upon it at the present time four sets of leaves, the lowest whorl of which are now nearly five years old, and rapidly decaying; but when the spring has fairly set in it will unfold another complete crown of leaves, and thus the trunk gradually increases in height year by year. These plants were brought from Noodsberg, twenty miles from here, where they grow on the sides of precipitous rocks and under slight shade, at an elevation of 3,000 feet or more above the sea-level. We have a species of cycad growing in similar situations near here, but which does not, even in old age, develop a trunk; its root is napiform, and, when dug out, as much as a man can carry with comfort; it bears pinnate leaves 6 feet or more long. Near this latter plant is *Stangeria paradoxa*, also a cycadaceous plant, found, I believe, only in Natal, and named in honour of the late Dr. Stanger, Surveyor-General. It is a very common plant in this neighbourhood, both in the open grass and in bush, and has the fruit of a conifer with the venation of a fern. On one side of the grass-plot is a fence formed of an *apocynaceous* plant of the genus *Carissa*, called here the "Amatungulu," and which bears a fruit which is much esteemed. It has pretty white star-like flowers, and plum-shaped

scarlet fruit, but its double or forked thorns make it a rather unpleasant plant to come violently into contact with. The fruit, when unripe, is rather astringent, and full of a white milky juice; and it is a standing joke here, that J. C. Byrne, the emigration-agent in the earlier days of the colony, when speaking in England of the natural products of the place to which he wished to attract the emigrants, said that in Natal the strawberries and the cream grew upon the same plant. The fruit is extensively used for making jams and jellies, a large quantity of which is, I believe, exported. At each end of this fence, and also around and near the house, are trees of *Eucalyptus globulus*, a native of Australia, some of them 70 feet high, though I believe only twelve years old; and twining round one of these gum-trees is the stem of a native plant, *Testutidinaria elephantipes*, the Tortoise-plant, or Elephant's foot, a singular-looking plant, belonging to the family *Dioscorea*, or Yams. Its rhizome, which is above ground, is hard and tesselated; and in my specimen the resemblance to a tortoise is sufficiently startling. It is perennial, and sends up a slender twining stem to the branches of the trees amongst which it grows, while the rhizeme sends down tough wiry rootlets, with which it takes firm hold of the ground. The specimen under notice was the first which I had seen, and in climbing up some rocky ground I placed my hand upon it, but quickly withdrew it under the impression that it was the shell of a tortoise. There are, I believe, two species of this plant in the colony, but I have only met with one as yet. We have also two species of *Gardenia*, *G. globosa*, now completely covered with its creamy bell-shaped flowers, and *G. grandiflora*, with larger, salver-shaped flowers, which fill the garden with a delightful perfume. Then there is that rare plant, *Mackaya bella*, with its pale lilac pendulous flowers and curiously-veined corolla. I have been informed that this plant is only found wild in the valley of the Tongaat, but whether this is correct or not I do not know; at any rate, it is not by any means common. Then we have a croquet-lawn, formed of a running grass which is commonly used for that purpose here; and at one end of it stands a row of trees which have originally been stakes in a post and rail fence, but which have now grown into trees, some of them fine ones; two belong to a species of *Aralia*, common here, and much used for fencing, as the post will generally take root. Two others are fig-trees, of a species plentiful about here, and which have now grown into fine spreading trees, 20 to 30 feet high, with leaves which are thickly covered underneath with small peltate scales or glands, the use of which I have not been able to discover. While the leaf is fresh, they appear, under the microscope, to be closely adpressed to the leaf; but as the leaf dries, they curl up at the edges, and are then easily detached, leaving a small pit or hollow. Three more of these trees belong to the genus *Erythrina*, or, as it is called here, "Kafir Boom," and are now covered with beautiful scarlet blossoms, but without a single leaf. This tree is common in the colony, and during the winter months its magnificently-coloured flowers make it a very conspicuous object. We have several species in the colony, two of which are growing here; one is usually called the "Cork-tree," as its bark has much the appearance of rough cork; its leaves are large and coarse, and the wood of both species is so light, that I believe it is sometimes used for floats in fishing. I have used it for setting butterflies, for which purpose it answers almost as well as cork, which is not procurable here. And I have no doubt that it may yet be put to many other uses, though at present it is not used, as far as I know, for anything but fencing. I have also a small fernery, of which I may have something to say on another occasion, should it be acceptable to your readers, and also about the numerous wild flowers growing so profusely in this neighbourhood.

THE LATE ANDREW MURRAY, F.L.S.

By the death of Mr. Andrew Murray, which occurred on the 10th ult. at his residence in Bedford Gardens, Kensington, entomology and botany loses an assiduous and careful worker. Born in Edinburgh in 1812, he paid some attention in his youthful days to the study of medicine. He was, however, educated with a view to following the law as a profession, and for a short time practised as a Writer to the Signet. Subsequently he assisted his relative, John Murray (Lord High Advocate), in his desire to provide some practically useful reading for village schools by writing a little pamphlet entitled "The Skip-jack; or, Wire-worm and the Slug," which, though published without his knowledge, may be considered as his first contribution to economic entomology. The year preceding his removal to London, he contributed to the "Transactions of the Royal Society of Edinburgh" a paper relating to a subject then under discussion, as to what extent the unity of species in the parasite showed unity of species in the animal preyed upon; "the pediculi infesting the various races of man," giving minute descriptions and considerations as to how far the variations might be considered to amount to specific differences.

After his removal to London in 1860, Mr. Murray devoted himself specially to the sciences of entomology and botany. About this time he became officially connected with the Royal Horticultural Society, being appointed assistant-secretary. After relinquishing this post, he continued, almost to the moment of his death, to show a great interest in the society, being one of the strongest supporters of, and most frequent attendants at, the meetings of the scientific committee.

In 1869 he formed one of a party, including Sir

Joseph (then Dr.) Hooker, of representatives of English science at the Botanical Congress at St. Petersburg. In acknowledgment of the service rendered on this occasion, he was presented by the Emperor Alexander with a splendid malachite table. During his absence from England at this time, he paid considerable attention to the subject of Continental forestry, and every facility was given him in his inquiries in Belgium by the Belgian Government. In 1871 he undertook the laborious task of superintending much of the selection or arrangement of the English exhibits at the Polytechnic Exhibition at Moscow in the following year. In botanical science, Mr. Murray's work lay principally among the Coniferæ, having written a small book on the "Pines and Firs of Japan," and contributed numerous papers on the same group of plants to different scientific and horticultural journals. He was secretary to the Oregon Committee, who sent out a collector to Oregon and California to collect Coniferæ, and in 1873 he undertook an expedition to Salt Lake and California, partly with a scientific object, and partly with a view to investigate the working of the silver-mines. In the course of his mining investigations he was exposed to considerable danger, minute inquiries making him obnoxious to some of the parties concerned.

In his entomological career, the great point was the devotion of the last ten years of his life to the subject in its practical bearings. As a monument of his skill and profound knowledge on this point, the results stand in the Government collection of economic entomology at Bethnal Green. The charge of receiving and arranging the contributions to this collection was placed in his hands officially in 1868, and from thenceforward he may be said to have given himself up to the task unceasingly, down to his latest hours; for, during his American expedition, he left behind him the threads by which the collection might be proceeded with in his absence.

Of the patient labour and scientific research he displayed in this collection it is impossible to speak too highly. Under his guidance the life-histories of the insects (of which knowledge was required to ascertain their remedies) were, in some cases, worked out, in others verified and amplified; remedies were ascertained and experiments initiated; and the whole life-history was shown at once correctly, scientifically, and as clearly as possible to the popular eye by illustrations of the insect in its various stages, and the object injured, accompanied by drawings and, when possible, *fac-simile* models. Mr. Murray was an accomplished draughtsman, and a large number of the insect drawings are his own work, in all cases clearly executed, and many, especially those of the Coleopteræ, really works of art. On this collection he was working up to his latest days, having, we believe, a quantity of material in progress of arrangement. It is much to be regretted that his descriptive catalogue of the collection should not have progressed beyond the first volume devoted to the Aptera, which was to have been followed, as we learn from an introductory note, by a complete series. The compilation of such handbooks is a work requiring great knowledge of the subject, as well as familiarity with writings of previous observers, and the head and hand which formed the collection could best give us the description which utilizes it for general reference.

Mr. Murray contributed valuable papers of original observation both to home and foreign scientific societies and serials, and amongst his larger works, his volume on the "Distribution of Mammals" is one of very great value, with regard to the representation of families, both prehistoric and present, and also for its synonymic lists and tables.

It is said that Mr. Murray's health suffered much during his American tour, but that the immediate cause of the unfavourable change was due to the amount of chloroform inhaled whilst rearranging a portion of the Doubleday collection infested with Mites. He was not in strong health at the time, but continued at his post from day to day, trusting that after effects might wear away; his general health, however, sank from that time, and all who had the privilege of knowing him will feel that by the death of Andrew Murray they lost a true-hearted and loyal friend, as well as a gifted naturalist. J. R. J.

ON SOME RECENT FORAMINIFERA FROM THE SHETLAND ISLES.

By George Robert Vine, Jun.

SOME time ago my father gave me a small packet of dredgings that he had received from Mr. Lovett, Holly Mount, Croydon. The dredgings consisted of minute particles of broken shells, quartz, &c., but especially of Foraminifera. These I worked out, and the following is a list of the species obtained.

Globigerina bulloïdes, D'Orb., both in the young and mature state, were very plentiful; *Rotalia Beccarii*, Linné, very small, but showing the character of the genus well; *Rotalia orbicularis*, D'Orb., and varieties, small, transparent, and perfect, common; *Planorbulina* (*Truncatulina*) *lobatula*, Walker and Jacob, very common in Dog's Bay, &c., but only 8 or 9 specimens here represented the genus, and all these were not very distinct in the septa and foramen, but distinct enough to identify the species; *Operculina ammonoides*, Gronovius. This is a species hat can hardly be mistaken for another, being ammonite-like (as the name implies), with the septa distinct and double (see fig. 31); small and middle size, rare; *Pulvinulina Micheliniana*, D'Orb. (see fig. 28). This is a peculiar species: it has three different views; the front is raised very much, with the septa rather wide apart; the bottom is flat, with two convolutions showing the primordial, and the side view is bell-shaped; middle

size, rare. One species, resembling a *Nonionina,* is rather common: it is middle size, and has all the septa, foramen, &c., very much obliterated. Another most beautiful form is very common: it is small, semi-transparent, and very distinct; the segments overlap one another, and in the 3 or 4 segments the septa form a fork-like arrangement; the foramina are clearly seen with a low magnifying power. This one, with figs. 33 and 34, I cannot name, and I should feel obliged if anybody could help me to name it.

Fig. 25. *Lagena distoma*; nat. size, $\frac{1}{24}$ in.

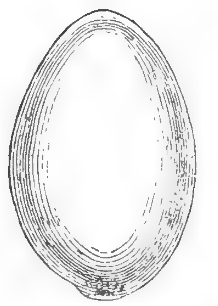

Fig. 26. *L. globosa;* nat. size, $\frac{1}{48}$ in.

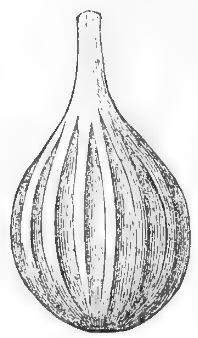

Fig. 27. *L. sulcata;* nat. size, $\frac{1}{48}$ in.

Of the genus *Textularia*, small, transparent, and perfect specimens were very common, but the larger and opaque ones rare. Five species of *Textularia* were found, but there is only one of them that I can name, and that is *Textularia abbreviata*, D'Orb.: it is small, transparent, and rare. Two other species

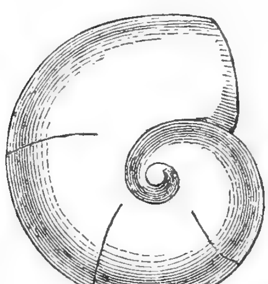

Fig. 28. *Pulvinulina Micheliniana;* nat. size, $\frac{1}{32}$ in.

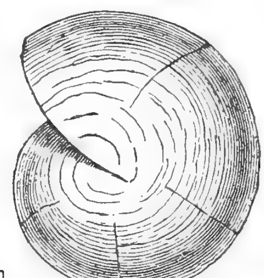

Fig. 29. Side-view of ditto.

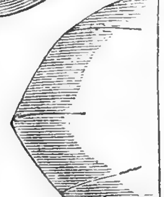

Fig. 30. Front view of ditto.

were small and transparent. One of these I have figured to show the points protruding from the side of the shell. One of the opaque forms is about the $\frac{1}{24}$ of an inch in length. The chambers go down to a fine point, are rather wide at the top, and a slight bit wider in the middle. It is very difficult to recognize the species on account of the middle portion being covered over by some arenaceous matter, thereby hiding the characters that in some respects determines the species.

Of the *Lagenida*, some very good species here represented this family. The first of these is the neckless variety of *Lagena sulcata,* Walker and Jacob. It is a small form, and rather rare: only one of the three specimens obtained show the lines that traverse the shell distinctly. *Lagena globosa*, Montagu (see fig. 26). This form is very small and rare. It is a globular shell without any striæ or foramina visible. *Lagena distoma politia*, Parker and Jones. This is an elongated species, having the neck about half the size of the body. All three of these species of *Lagena* have been figured by Messrs. Parker and Jones in their paper on the Arctic Foraminifera, in the Philosophical Transactions for 1865, Part I. *Cristellaria rotulata* (fig. 36), Lamarck; small and middle

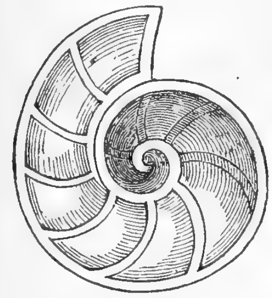

Fig. 31. *Operculina ammonoides;* nat. size, $\frac{1}{40}$ in.

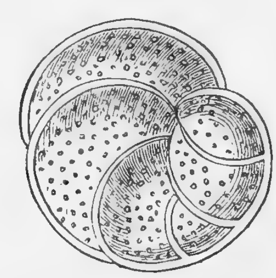

Fig. 32. *Nonionina* (?); nat. size, $\frac{1}{48}$ in.

Fig. 33. *Textularia,* sp.

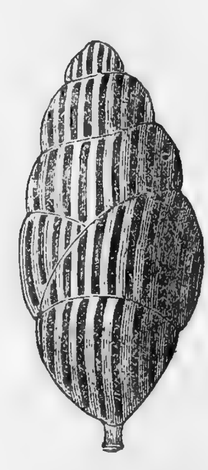

Fig. 34. *Uvigerina pygmæa;* nat. size, $\frac{1}{32}$ in.

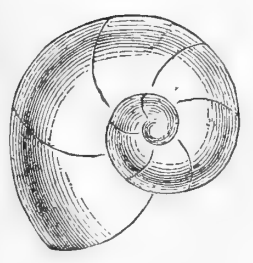

Fig. 35. *Rotalia orbicularis.*

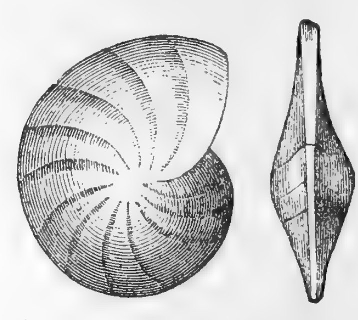

Fig. 36. *Cristellaria rotulata;* nat. size, $\frac{1}{32}$ in.

size, rather rare. A good specimen, showing the septa well. Another peculiar species is an elongated form traversed by rather deep furrows, as in *Lagena sulcata*, with the septa placed in rather irregular positions. Four good examples were obtained, all showing different characters (see fig. 34). The *Miliolida* family was here represented by three very characteristic species. The first was *Triloculina*

oblonga (?). These were very minute and indistinct; rather rare. *Biloculina ringens:* this is a most beautiful and perfect specimen; it is of a white colour and middle size. Rare. *Spiroloculina canaliculata,* D'Orb. (fig. 37). Two perfect examples of this species were found, showing the character of the genus well. Small and rare.

In this short paper I have endeavoured to give an idea of the character of the Foraminifera found at Shetland. I have not given all the species found there, and only those that I possess myself. I have drawn the figures myself, without the aid of the camera lucida. In my research among this bit of sand I find that nearly all of the Foraminifera are of

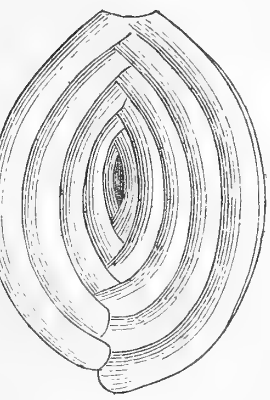

Fig. 37. *Spiroloculina canaliculata;* nat. size, $\frac{1}{40}$ in.

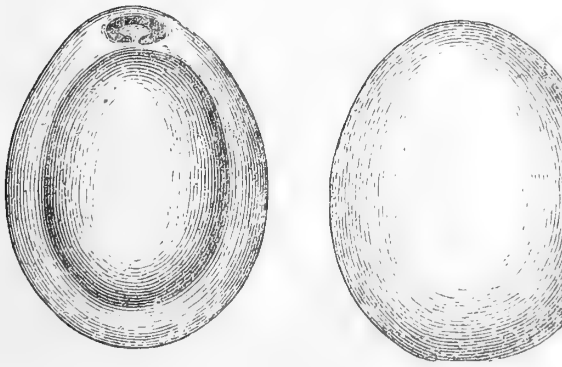

Fig. 38. *Biloculina ringens;* nat. size, $\frac{1}{32}$ in.

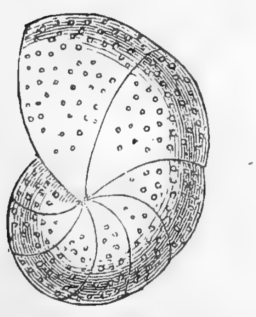

Fig. 39. *Truncatulina lobatula;* nat. size, $\frac{1}{48}$ in.

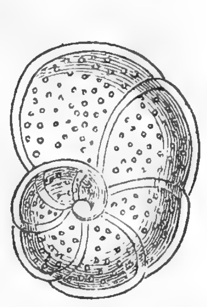

Fig. 40. Ditto, other side.

a brownish colour, showing that the water is impregnated with oxide of iron; also that the *Globigerina* are dwarfed and thin, owing to the shallowness of the water, 120 fathoms, whilst the same species from the Atlantic, at a depth of 1,450 fathoms, are larger and more bulky. And this gives the fact that the *Globigerina* grow larger and more bulky in deep water, whilst they are dwarfed and thin in shallow water.

Attercliffe, Sheffield.

NOTES ON THE DEVELOPMENT OF FROG'S SPAWN.

By A. M. M'Aldowie, M.B.,

Member of the North Staffordshire Naturalists' Field Club.

PROBABLY no animal is better known, from an anatomical and physiological point of view, than the Common Frog. Developmentally the frog has been specially studied, on account of the interesting metamorphoses through which it passes before it arrives at maturity, and also on account of the advantages which its egg offers for the examination of the ovum, the transparent albuminous covering affording unrivalled facilities for observations on, and experimental investigation into, the subject of development. The microscopic structure and changes

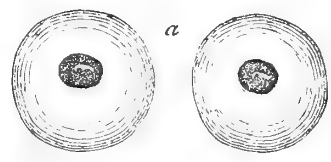

Fig. 41. Frog's Spawn; nat. size, March.

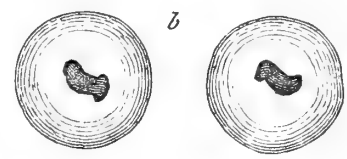

Fig. 42. Ditto, April 4th.

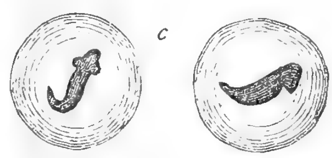

Fig. 43. Ditto, April 8th; dorsal aspect; lateral aspect.

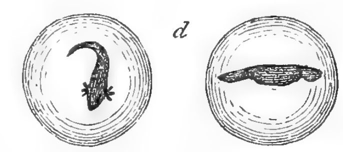

Fig. 44. Ditto, April 11th; dorsal aspect; lateral aspect.

which are observed during the development of the embryo of the frog, are described and figured in most text-books of comparative physiology and histology, but the ordinary naked eye appearances and modifications which it exhibits are not to be found in these works. Nearly all zoological manuals give a series of illustrations representing the various stages in the development of the tadpole after its escape from the egg, but they do not figure the alterations which take place previously, without which the series cannot be considered complete. St. George Mivart, although he details the process of yolk subdivision and cleavage, and the other microscopic changes through which the embryo passes, yet with regard to the naked eye appearances he merely states,* "Gradually the embryo assumes the form of a young tadpole, and is provided with a pair of little 'holders' (or organs for adhesion), just behind the mouth, with six openings on each side of the neck, and with a pair of rudimentary external gills." Huxley, in what is undoubtedly the best work on the frog extant, in reference to this subject says,† "While still within the egg the embryo assumes the form of a minute fish, devoid of limbs and with only rudiments of gills, but provided with two adhesive discs on the ventral

* The Common Frog (Nature Series), 1874, p. 15.
† Elementary Biology, 1875, p. 155.

side of the head behind the mouth." The following notes, although very crude and imperfect, may serve to draw the attention of some of the readers of SCIENCE-GOSSIP to this interesting subject during the season which is now approaching. I intended to supplement them the following year, but had no opportunity of doing so.

About the end of March, 1874 (exact date uncertain), I exposed a mass of frog's spawn to the light in a glass tank, placing it in a window having a westerly aspect. There was no fire in the room. The small round ovum (fig. 41) gradually became elongated, assuming at first an ovoid form, but afterwards one end became attenuated, while a small groove formed near the other extremity, and on the 4th of April most of them presented the appearance shown in fig. 42. As the embryo enlarged, these characters became more marked, until, on the 8th, the form of the head and the body could plainly be detected (fig. 43).

April 8th. Most of the embryos show signs of animation. The movements consist of alternate flexion and extension of the body, the animal folding itself up laterally and then straightening itself at intervals of about half a minute. Movements first observed in the afternoon, and continued till sunset.

April 9th. Movements more active than yesterday, but still as restricted as before.

April 10th. Movements not quite so quick as yesterday, but more extensive and fish-like.

April 11th. Most of the tadpoles appear to be trying to free themselves from the albuminous mass by quick wriggling movements. External gills very plainly seen on all (fig. 44). They first appeared as two small protuberances, situated one on each side of the hinder part of the head. These gradually elongated, divided and subdivided, until they presented the appearance of small branched filaments.

April 12th. Tadpoles all out this morning. Arrange themselves in clusters with their heads all in one direction. Most of them remain quite motionless, but a few swim actively about the tank.

Stoke-on-Trent.

A GOSSIP ABOUT NEW BOOKS.

THE present winter has not been remarkable for the number of scientific books issued. When wars and the rumours of wars prevail, and the reading world has its taste demoralized by the vivid descriptions of such rapidly-succeeding events as those which have marked the history of the last six months, it is hardly to be wondered at that scientific literature should retreat almost to the vanishing-point. But there is a break in the clouds, and thoughtful people are hoping that the storm will clear away as fast as it gathered; then we shall return to soberer literature than war and anti-war newspaper leaders, with a sense of relief and a fervent thankfulness for our narrow escape.

Notwithstanding the paucity in the issue of first-class scientific books, the appearance of a new volume from the pen of Darwin is always sufficient to create interest. And perhaps of the works which that industrious author has recently published, none is more important than the present work, entitled, "The Different Forms of Flowers on Plants of the same Species" (London, John Murray). Herein Dr. Darwin has entered into the minutest and fullest investigation of the inner structures of flowers. We now find how abundant are the phenomena of *trimorphism* and *dimorphism* (only a few years ago deemed so peculiar and exceptional), and that the number of species bearing *cleistogamic* flowers is also being added to every day; that the latter structure of flowers, produced by exceptional circumstances, varies from one extreme to the other, and that these extremes are connected by an inosculating series. Thus the Grass Pea (*Lathyrus nissolia*), bears cleistogamic flowers, which can hardly be told from the ordinary flowers just before the latter finally expand. At the other extreme we find cleistogamic flowers which are actually fertilized beneath the soil, and so are little above the condition of subterranean buds. Dr. Darwin further enters into the sizes and shapes of the pollen-grain produced by different-sized stamens in dimorphic and trimorphic plants. The absolute necessity for crossing to be produced, by the pollen from the flower of one plant being carried to the pistil of another plant, comes out strikingly in Dr. Darwin's experiments; for it is proved that very little is gained by the pistil of a flower being fertilized by the pollen of another flower borne by the same plant. The origin of monœcious and diœcious flowers, of nectaries in flowers, and many other singular and striking botanical peculiarities, are here discussed in the easy but philosophical style for which all the author's books are celebrated. It is truly a rich treat to the botanist to peruse such a book as this, and one to which all our readers who have not yet read it will thank us for attracting their immediate attention.

"The Antelope and Deer of America," by John Dean Caton, LL.D. (London, Trübner & Co.), is a handsome treatise upon the natural history, including the characteristics, habits, affinities, and capacity for domestication, of the *Antilocapra* and *Cervidæ* of North America. This is a question of the deepest importance in practical natural history, and one which has been too much neglected. Books on wild animals usually tell us more about their destruction under the name of "sport" than of possibilities of their domestication and utilization. Dr. Caton tells us he has for many years kept in domestication the American antelope, and all of the American deer of which his book treats, except the moose and the two species of reindeer. This book deals with the important and difficult subject selected by the author with a fulness

which leaves nothing to be desired. The structural affinities and habits of the various kinds of deer, and their comparison with each other, are most clearly set forth. To a zoological student this book has a peculiar and special value. The woodcuts are numerous, original, and well done.

"Proteus; or, Unity in Nature," by C. B. Radcliffe, M.D. (London, Macmillan & Co.), is the second edition, revised and brought up to the newer views of science, of a book which created some attention when it first appeared some years ago. Practically it is quite a different volume to what it was then, when the disturbing theory of evolution was either unknown or ignored. Dr. Radcliffe is an opponent of evolution, and although not a prejudiced one, we cannot help feeling he has not taken sufficient pains to fully understand it. Apart from this we have read his book with sincere pleasure and profit. It most thoughtfully and reverently discusses the many-changing varieties of Nature, physical, animal, and vegetable; and dry facts and their relations light up with the glow of the author's genius. The literary style is of the most attractive character, not demonstratively fervid, but chaste and yet enthusiastic.

"Physiography," by Professor Huxley, F.R.S. (London, Macmillan & Co.), will be hailed with pleasure by science students. Although we do not like the new name with which the South Kensington authorities have replaced the older one of Physical Geography, Professor Huxley shows us in this handsome and well got-up volume how natural phenomena may be studied in the concrete, even in their relation to our earth, in a wider and deeper sense, perhaps, than was undertaken in the science of physical geography. The author eschews the old system of treatment in works on physical geography, wherein the readers were *first* taught about the shape and motions of the earth, &c., and begins just at the other end, leaving such astronomical facts to be discussed last. The river *Thames*, in fact, is employed as a sort of scientific text, and Professor Huxley makes its relations and associations the groundwork of a general description which will answer almost equally well for any other river and river-valley in the world. The plan is admirably worked out, as we might reasonably expect it would be at the hands of such a master.

"The Origin of the World," by Dr. J. W. Dawson (London, Hodder & Stoughton). Dr. Dawson is well-known as an ardent field geologist, and one who has largely and successfully contributed to the vast storehouse of geological knowledge. Unfortunately he appears to us to be an equally ardent theologian; and so, when he writes books on geology in general (and he always writes them well and attractively), he cannot forget the theological bayonets against which the stony science has been repeatedly impelled. The consequence is a *mélange* of geology and theology, which we are afraid is not of special advantage to either. Especially is Dr. Dawson angered with the theory of evolution, and he loses not an opportunity to tilt against it, frequently with as much success as Don Quixote's similar attempt to overthrow the windmills. The present volume is especially saturated with what Professor Huxley calls "Mosaism"; one almost feels as if we had gone back to the time of Hugh Miller. But there are many readers who are fond of discussing the many points of contact which still exist between Genesis and geology; and to such we can confidently recommend Dr. Dawson's book as likely to please them in no ordinary degree.

"Accidents in Mines: their Causes and Prevention," by Alan Bagot, Mining Engineer (London, C. Kegan, Paul, & Co.). In this small but attractive volume the author has collected all the information possible, as seen by those who are engaged professionally as mining engineers, in order to its being brought before the public. He discusses whether the principles of Davey's Safety-Lamp hold good when the atmospheric pressure is as great as we find it in deep coal-mines. Also, what effect the vibrating waves of sound may have on the flame within the lamp when the latter is surrounded by an explosive mixture of gas. Mr. Bagot thinks that in the solution of these two problems lies the secret of explosion after shot-firing in mines. In the eighteen chapters which compose this book, the author enters most fully into the economy of coal-mines, and all that concerns their safe and effective working. The work is therefore a most valuable one, and ought to be in the hands of all those whom the subject directly or indirectly concerns.

A REMARKABLE GARDEN PLANT.

(*Thunbergia alata.*)

THIS very pretty tropical climber, belonging to the natural order *Acanthaceæ*, a native of India and Madagascar, was introduced to our gardens some fifty years ago. It presents in the structure of its flowers numerous points of interest. The plant is a slender twiner, with hastate leaves, whose petioles, as the specific name *alata* implies, are broadly winged. The calyx is very minute, consisting of twelve hair-like sepals, its place being occupied by two large membranous, almost transparent, bracts. These are strongly keeled, and overlap each other, completely enveloping the calyx, and about one-half of the corolla tube. Besides the keel, there are about six well-marked longitudinal veins, connected by numerous smaller ones almost at right angles, forming a rectangular network somewhat resembling that of *Ouvirandra fenestralis*. The whole surface is beset with scattered hairs, which are either simple, or with one or two septa, and bent where the septum occurs. They are hollow, except at the nodes and near the points, the hollow portion terminating in a bulbous

expansion similar to a nettle-sting. There is but little chlorophyl, a large portion of the bract being occupied by air-spaces, into which numerous long, narrow stomata open. The corolla is salver-shaped, slightly oblique, and of a clear Nankeen yellow, the colour being somewhat brighter round the throat. In some forms the throat is a dark chocolate-brown, almost black, while in one variety the limb is pure white with a dark throat. The stamens are four in number, and are situated far down in the tube of the corolla, the interior pair being considerably shorter than the exterior pair. The filament is inserted into the dorsal portion of the connective, a short distance from the base of the anther, thus giving the ventral face of the anther a slight inclination forwards and upwards.

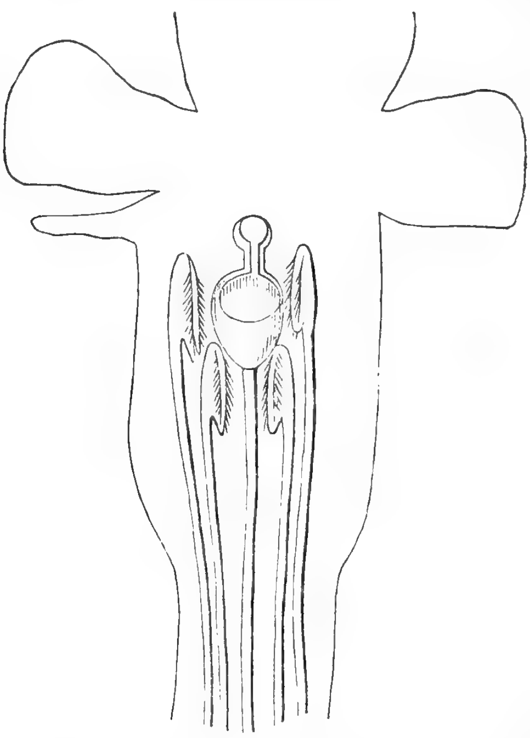

Fig. 45. Diagram of flower of *Thunbergia alata* (vertical section).

The anthers adhere by the ventral suture, the projecting margins of the lobes being densely bearded with hairs of a peculiar and interesting form. They are slender and clavate, consisting of numerous joints. The lower are oblong, three or four times as long as broad. Proceeding from the base upwards, the joints become shorter, thicker, and more rounded, and with deeper constrictions, giving a beaded appearance, the uppermost one being frequently divided by vertical septa into two or three. These topmost cells are some twice or thrice the diameter of what I may term the stem of the hair, the whole of which, from base to summit, is finely tuberculated, the tubercles increasing in number and size from below upwards. A trace of this tuberculation occurs also on the hairs of the bract, but to a very much smaller degree. The pollen, which, like the anthers and the anther hairs, is almost white, is spherical, and has several broad, flat, spiral grooves winding round it in opposite directions, producing a very curious appearance. The pistil is long and slender, passes up between the interior and shorter pair of stamens, and, like them, is closely adpressed to the back of the corolla tube. The stigma, which is situated a short distance above the upper stamens, appears to consist of two parts. The upper portion is the style slightly flattened and curved round into a kind of a narrow funnel, at the base of which, and on the front of the style, is a semicircular cup-shaped body, which seems to be a further development of the stigma, as I have observed numerous pollen-grains adhering to its viscid edges. The concave surface of this cup is upwards, the convex downwards. Thus it appears that every precaution is taken to avoid self-fertilization. The corolla is almost erect,

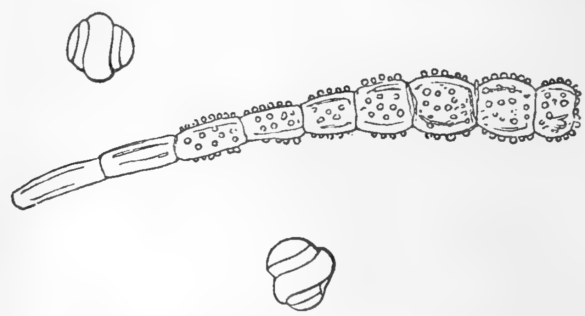

Fig. 46. Anther-hair and pollen-grains of *Thunbergia* × 200.

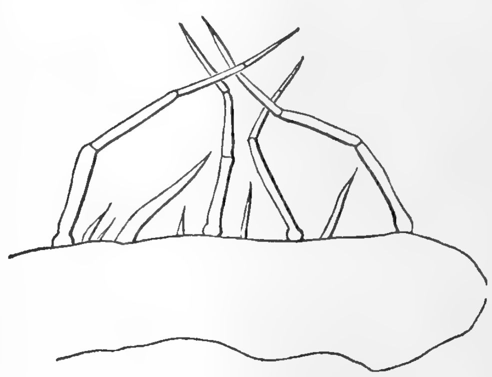

Fig. 47. Hairs of bract of *Thunbergia* × 50.

the stamens densely bearded on the ventral or front side, with hairs pointing downwards, which hairs, still further to retain the pollen from any accidental disturbance from wind, &c., are club-shaped, thickened at the apex, and closely tuberculated, while the pollen-grains themselves have spiral grooves to increase their tenacity to the hairs. Again, the stigmatic surface is turned directly away from the pollen, so that it is scarcely conceivable that self-fertilization could take place. Suppose an insect with a long proboscis visits the flower, its proboscis passes downwards freely to the base of the corolla; on withdrawing it, the trunk cannot fail to brush upwards or backwards some of the anther hairs, and in so doing set free some of the pollen which adheres. The horizontal and non-stigmatic portion of the pistil being downwards, receives none of the pollen. The insect visits another flower, and thrusts its proboscis, laden with pollen, into the corolla. In so doing, the stigma being in a narrow portion of the tube, is nearly certain to intercept some of the grains, and thus ensure fertilization. Even should this fail, touching the base of the style causes it to bend forward, and thus be ready for the next comer. The

truth of this is readily proved, for flowers which are "set" artificially freely produce seed, while those left to themselves, being grown under glass, and thus out of the reach of most insects, never come to maturity. The seed-vessel is somewhat curious, as well as other parts of the plant, being in shape a flattened sphere with a long beak, and contains two to four hemispherical rough blackish seeds. Altogether, whether as botanical curiosity, or a garden ornament, this Thunbergia is well worth growing.

GREENWOOD PIM, M.A., F.L.S.

THE POTATO-BEETLE.

IN thanking Mr. W. V. Andrews, the Corresponding Secretary of the Long Island Entomologists' Society, U.S.A., for his kind and complimentary allusions to myself on page 1 of the present volume, I am reluctantly compelled, as he classes me "in the ranks of the alarmists," to conclude either (1) that I have, in my article on the Beetle in question, in SCIENCE-GOSSIP of 1st September last, acted unwittingly upon the principle that language is given us to conceal our thoughts; or, (2) that Mr. Andrews does not thoroughly understand the English tongue. There is some slight excuse for the first hypothesis in my remarks upon South Kensington on p. 202; and it is humiliating to have to point out, even to an outsider, that these were "written sarkastic," as the great Artemus says. For the second one, I must refer to my express statement, on p. 203, that "to the writer it seems that our much damper and colder climate, not affording opportunities for the rapid succession of broods which the insect develops in America, must materially militate against its obtaining a permanent hold; and the collateral arguments, that no American beetle has ever established itself in England, and that we possess no near ally of this particular one, cannot fail to have some weight in the matter." The fact is, that to every Coleopterist of my acquaintance, and to every one (the name is legion) with whom I have had conversation on the subject, it is well known that I have from the first steadily and strenuously been opposed to any belief in the idea that the potato-beetle could be of any harm in this country; and this view I have always upheld in everything I have written. Indeed, I have a firm conviction that, if circumstances had not prevented the present Editor of SCIENCE-GOSSIP (long may he reign!) from attending the Plymouth meeting of the British Association, where there was much talk, post-prandial and otherwise, upon this subject, the false conclusion as to my being among the alarmists would never have appeared—at all events, without simultaneous correction.

Mr. Andrews says:—"Mr. Rye tells you that Paris green is a favourite remedy here, but he does not understand the American mode of doing things. Some State entomologist or other probably had a friend in the oil or colour business," &c., and, "You do not do things in that way in honest old England, but we do here." Without going so far as to quote a homely Saxon proverb, concerning a certain ill bird and its nest, I must, remembering Riley, Le Baron, Packard, Cyrus Thomas, and other "good men and true," of whose scientific help the U.S. Government has wisely availed itself, energetically disclaim the acceptance of such remarks as these as a sample of the "SCIENCE-GOSSIP" of the States. It is to the first-named of these authorities that we owe most of our knowledge of Transatlantic economic entomology; and his reputation is far too securely established to be shaken by the insinuations of even the Corresponding Secretary of the Long Island Entomologists' Society. That gentleman's concluding caution to English readers, that all striped beetles found on potatoes are not Colorado beetles, but may be useful little fellows, &c., shows an ignorance of our Insect Fauna, remarkable in one who proposes to allay our (hypothetical) fears.

E. C. RYE.

NOTES FROM WEST KERRY.

ONLY a few species of *Cetacea* are known to frequent the Irish coast; the common porpoise is of every-day occurrence; the pilot-whale (*Globiocephalus Svineval*) is often met with in large numbers, and an immense *Balæna* is occasionally cast on shore. All the smaller species of *Cetacea* are termed "Porpoises" by the Irish peasantry, who value them, not only as excellent food, but attribute to their flesh and oil hygienic and medicinal properties. Consequently, whenever one or more happen to be stranded, they rush in crowds with scythes and sickles, hatchets, pitchforks, spades, knives, and all manner of deadly weapons, to the scene of the occurrence, hew, hack, decapitate, and cut into fragments the unwieldy stranger, and long before rumour of the capture has reached any educated person, the coveted flesh is stored away in tubs, or piled in a corner of some sooty cabin; the entrails and useless *viscera* thrown into the receding tide or torn by hogs (the dear and cherished associates in Irish cabins of scrofulous children and of their filthy parents), and so far as science is concerned the unfortunate fish, seal, or cetacean, might as well have remained in his marine abode. On a March morning in 1864, on the shelving sandy beach of Fermoyle, skirting the waters of Brandon Bay, on the west coast of Kerry, I observed two men moving a heavy object, which on closer inspection proved to be part of the head of a cetacean such as I had never before seen. The head had been much larger, and divided vertically behind the eyes; the front portion only remained; the eyes, however, were left untouched, as also the lunated spiracle, with the concavity looking forward.

The measurements in the recent state of the animal were—

From centre of fold of spiracle to each eye, 10 in.

From same point to extremity of *upper* jaw, 22 in.

From commissure of lips to extremity of upper jaw, 13½ in.

From same to extremity of lower jaw, 14 in.

On the lower surface of the integuments corresponding to the space between the *rami* of the lower jaw, was a well-defined angle, formed by two depressed lines, or furrows, each ten inches long. These lines converged to an apex in front, while their extremities behind were seven inches apart. The acute angle thus defined corresponded, I say, externally with an almost equal internal angle, formed by the convergence of the lower jawbones, and giving accommodation to the deep pouch of the pharynx, as shown in my illustration With the kind assistance of my friend, Mr. R. Conway Hickson, whose finely-placed residence at Fermoyle is in the immediate vicinity of the scene of capture, the remains of the head were rescued from the destroyers and conveyed to Carthgregory, a neighbouring village, where scientific appliances are scarcely more numerous than "strawberries grown in the sea." However, under unfavourable circumstances four or five photographic illustrations were obtained from it—not artistic, certainly, but affording correct ideas, for the first time, I believe, of the physiognomy of the curious creature. Eagerly, as you may suppose, and at once, I consulted the few authorities within my reach, and found that this remarkable cetacean had not been previously recognised as a visitant of the Irish coast, nor of Great Britain, save once before, in 1790. In Jardine's "Naturalists' Library" it is described and figured as DIODON SOWERBII, but the Plate there given has little resemblance to the animal, and none as regards the beak, its most conspicuous peculiarity. It is described, though not figured, in the "English Cyclopædia, as "ZIPHIUS SOWERBII," and that is now its recognised appellation.

The genus "ZIPHIUS" is remarkable chiefly for its elongated jaws, which extend to, at least, a length of fourteen inches from the commissure of the lips, and form a beak or snout of great solidity and strength. The upper fits into the lower as a cylinder into a semi-cylinder. Before the lower jaws converge to form this semi-cylinder, and posterior to the point where the front of the pharyngeal pouch is attached to the bone, *one* stout pyramidal tooth is inserted in a deep socket on each side of the lower jaw; thus the tooth is nine or ten inches from the extremity of the beak. The soft parts on the upper jaw are notched on each side for the reception of the high projecting tooth; these teeth are believed to be characteristic of the male. Though found in the Scotch and Irish animals, there are a few specimens in Continental museums from which they are absent; this absence was supposed by some to indicate difference of *species*, by others to be merely a *sexual* distinction. The genus *Ziphius* is comparatively new to Natural History. Nothing was known of it till some fossil remains were sent from Holland and from the south of France to Cuvier, who, not being then aware of any existing cetacean with similar beak, supposed the remains to belong to an *extinct* genus. The discovery in Scotland, in 1790, proved that this supposition was erroneous, and a very few living specimens met with since have shown that *Ziphius* does exist in modern seas. Still they are extremely rare, and an unmutilated specimen would be of great anatomical interest, and its skeleton a *desideratum* in any museum.

In 1870, after a lapse of six years, it was my fortune, alone of all men, I believe, to meet with a second Ziphius, about five or six miles from the site of the first capture. This time the animal came in near Brandon Pier, a very interesting and well-known fishing-station, worthy of more remark than would be relevant here.

Before I saw it, it had been treated like its predecessor; its flesh had been cut into a thousand pieces by the greedy peasantry, and its bones unscientifically sawn and broken. I snatched a portion of its jaw from a dog's mouth, and disinterred parts of the split skull from a dungheap; and I dragged some portion of the skeleton, as well as part of the stomach which pigs had not torn, from the ebbing tide. The intestines generally were so mangled as to be useless for anatomical purposes; nor could any part of the solid viscera be obtained. An irregular hole, whose largest diameter may have been an inch, had been made in one compartment of the stomach, which I had taken from the tide-covered sand, and this compartment was completely filled with sand. I do not think it probable, or even possible, that the sand could have entered through the accidental aperture while for a short time under water. I cannot offer any explanation of *how* or *why* it was there; but who will affirm, in our total ignorance of the habits of the animal, that he did not swallow it during life, impelled by some unaccountable physiological necessity, or perhaps from depraved appetite, the result of disease? I opened what seemed to be a second compartment of the stomach, when more than a pint of bile rushed out. Anatomists have denied a gall-bladder to zoophagous cetaceans, but what was this?—or is *ziphius not* zoophagous? Nothing but sand and bile existed in these viscera; I was *much* pressed for time, and could not examine more closely into the matter, but sent both stomach and bile to Dublin to competent investigators.

Ziphius No. 2 was about seventeen or eighteen feet long, and was first observed on the beach at high water, in great uneasiness, floundering, and, of course, working a cavity in the sand, in which it remained when the tide had ebbed. When first approached by its butchers it was seen to open its cylindrical jaws in a portentous way, and to close them with an

angry snap, while from each tooth stood out laterally two or three large barnacles, giving it a wild and extraordinary appearance. Of these cirripedes only parts of the peduncles remained when I got possession, but, as the captors said, they were not common barnacles (*Lepas Anatifera*), so well known to all dwellers on the sea-coast; I am inclined to believe they were another well-known species (*Conchoderma Aurita*). The presence of these barnacles seems to discountenance an opinion which some might rashly entertain, that the sharp strong teeth, if not confined to the male, were used to impale the animals' prey, while being crushed by the powerful beak; but if such were the case, the impudent and daring guests would be rubbed off before they could become firmly fixed to their strange abode, so close to the maw of their monstrous host. On the other hand, the extremely sharp point of the tooth would seem to indicate constant use. As to the colour of the animal, the skin on the head of the Fermoyle specimen was of a glossy satiny black, badly represented in the photograph, owing to the reflection of light, but I cannot now speak with certainty of the mouths proper and the tongue. In the Brandon Pier specimen I cannot speak of the head, but the deep pharyngeal pouch was of the usual reddish colour of mucous membrane. I obtained a few square pieces with the natural skin, not torn or gnawed, black and glossy, but vermicularly marked with white streaks, up and down and across, in irregular network. Many of the streaks bore a singular resemblance to old cicatrices—scars from greedy marine warriors, inflicted, perhaps, by grampuses or sharks. Though I will vouch for it that Ziphius himself, if angry or jealous, could give a sharp nip to an enemy or rival, yet I do not believe that these teeth were given for attack or defence; if fixed at the *point* of the beak, they would be powerful instruments for either species of warfare. One of the spectators asserts, that when first stranded, the unhappy animal "roared like a bull." Another insists that he was perfectly silent. In this, as in almost every case, I would be inclined to believe the less sensational witness.

A recital of the synonyms applied to our long-beaked friend—ungallantly assuming that the toothless specimens are the females—would fail to interest your readers. Diodon, Physeter, Delphinorynchus, Mesodiodon, Dioplodon, Mesoplodon, are a few of the jaw-breaking epithets, dangerous to any jaw less mighty than its own! "ZIPHIUS SOWERBII," like Aaron's Rod, has swallowed the others.

My friend, Mr. William Andrews, the zealous and learned naturalist who has done so much for Irish Natural History, and especially for that of West Kerry, has given them all, and much information besides, in an excellent paper read to the "Royal Irish Academy," descriptive of Brandon Ziphius No. 1, to which I may refer all readers for information beyond the scope of my "gossip."

I placed the few fragments of skeleton No. 1 at the disposal of Lord Ventry, and of No. 2 at the disposal of Mr. Andrews, and I believe they are now in the museum of the "Royal Dublin Society."

J. W. BUSTEED.

THE SEALS AND WHALES OF THE BRITISH SEAS.

No. VIII.

By THOMAS SOUTHWELL, F.Z.S., &c.

ONE more British Ziphioid is known, SOWERBY'S WHALE (*Mesoplodon Sowerbiensis*, De Blainville); it was first described from a specimen which came ashore at Brodie, Elginshire, in 1800, and has since been found three times in Ireland; there is also a skull in the Museum of Science and Art at Edinburgh which belonged to a specimen believed to have been captured somewhere on the Scotch coast; the remains of five others are preserved in various Continental museums.

Of the individual which came on shore on the coast of Kerry, in March, 1864, Mr. Andrews has given a description in the "Transactions of the Royal Irish Academy," for April, 1867. Fortunately it came under the notice of Dr. Busteed, of Castle Gregory, who being interested in zoology, and aware of the great importance of the occurrence, photographed the head in several positions while it was yet fresh: Dr. Busteed's photographs were reproduced in the Transactions of the Royal Irish Academy. The head had unfortunately been removed immediately behind the frontal portion of the skull, the base of which is lost, as also the other parts of the skeleton. The total length of the animal was about fifteen feet, the two teeth largely developed and projecting like the tusks of a boar; these teeth are believed to be developed only in the males. On the under part of the throat the V-shaped furrow was very conspicuous. Sowerby's specimen was coloured black above, and nearly white below. The skin smooth like satin. "Immediately under the cuticle the sides were completely covered with white vermicular streaks in every direction, which at a little distance appeared like irregular cuts with a sharp instrument."

The remaining family, *Delphinidæ*, as has been said, is a very numerous one, it has ten representatives in the British fauna, contained in seven genera, the first of which, according to the arrangement I have adopted, is that of *Monodon*. The NARWHAL (*Monodon monoceros*, Linn.) is a native of the Polar seas, seldom leaving the ice; stragglers have occurred three times on the British coast, one in 1648 in the Firth of Forth, another came ashore alive at Boston, in 1800; the third was taken in Shetland in 1808. This species is very numerous in the frozen seas to the north of latitude 65°, and is remarkable

for the enormous development of the left canine tooth, which is projected forward in the form of a tusk or a spear, reaching to the length of six or eight feet. The spear is of fine compact ivory, hollow for the greater part of its length, grooved spirally along its outer surface, but smooth at the end, and bluntly pointed. The right canine is rarely developed, but a few examples have occurred in which both tusks were present (see Proc. Zool. Soc., 1871); the female is rarely furnished with this appendage. Not long since I saw preserved in a country mansion, the tusk of a Narwhal measuring 7 ft. 5 in. long; it was carefully kept in a long case resembling a barber's pole, and bore a ticket attached, which stated that it was "Bequeathed in 1561 by the Countess of ———, to her daughter ———." The use of this remarkable appendage appears very doubtful; it has been conjectured that it serves to stir up food from the bottom of the sea, in which case the female would be badly off without it; or that it is employed to keep breathing-holes open in the ice, and an instance is related in support of this view, in which hundreds were seen at an ice-hole protruding their heads to breathe, but it is not clear whether they made the hole for themselves, or whether they were attracted by it, particularly as there were numbers of White Whales with them. It seems certain, however, that the tusk, which is frequently found in a broken condition, is used for purposes of attack and defence. The Narwhal is very social in its habits, great numbers being often met with together; its food consists of cuttle-fish and crustaceans. The length of the full-grown animal is about 16 feet, the upper parts gray, the sides and belly white, and the whole animal spotted with black and gray. The only authentic figure of the Narwhal with which I am acquainted is that given by Scoresby; this is so well known from frequent reproduction that it is not necessary to give it here.

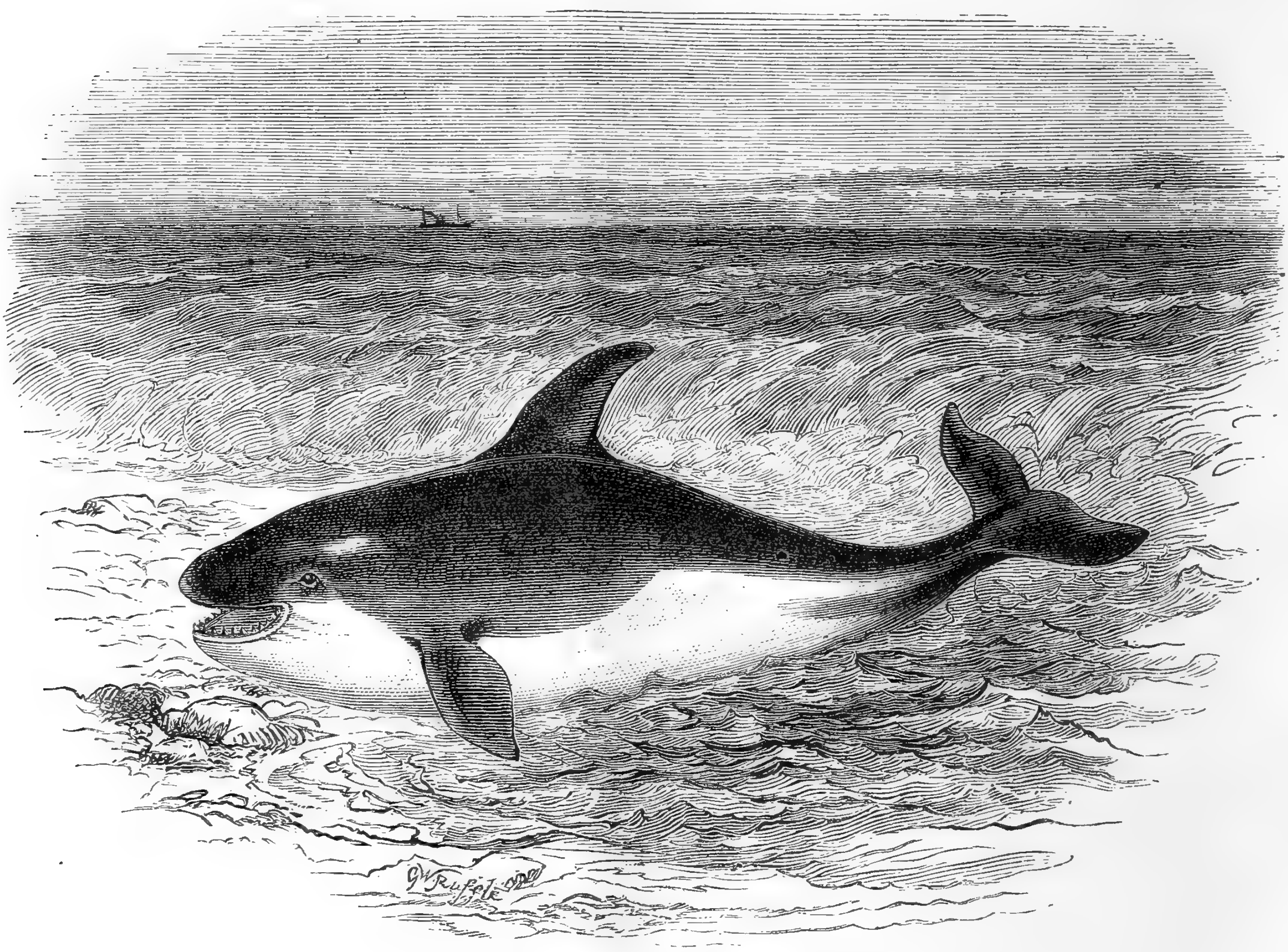

Fig. 48. The Grampus (*Orca gladiator*, Lacép.).

The WHITE WHALE, or BELUGA (*Delphinapterus lucas*, Pallas), like the preceding species is a native of the Polar seas, where it is common; it is abundant in the White and Kara Seas and in the Gulf of Obi; on the coast of Norway it is occasionally met with; and in our own seas has occurred several times, but must be regarded only as an accidental straggler. On the east coast of America it is found as far south as the Gulf of St. Lawrence, where, as in the White Sea, it delights in ascending the mouths of large rivers. In the British Association Report on the Fauna of Devonshire (1869, pp. 84 and 85), occurs the following passage. "Mr. P. H. Gosse writes:—'On August 5th, 1832, I was returning from Newfoundland to England, and was sailing

up the British Channel close to the land, when just off Berry Head, I saw under the ship's bows a large cetacean of a milky-white hue, but appearing slightly tinged with green from the intervening stratum of clear water. It was about 16 ft. long, with a round, bluff head. It continued to swim along before the vessel's head, a few yards beneath the surface, for about ten minutes, maintaining our rate of speed, which was five knots an hour, all which time I enjoyed from the bowsprit a very good view of it. It could have been no other than the White Whale, the *B. borealis* of Lesson.'" The whale lately exhibited at the Westminster Aquarium belonged to this species; unfortunately it did not live to equal in docility and intelligence a specimen exhibited in America, which "learned to recognise his keeper and would allow himself to be handled by him, and at the proper time would come and put his head out of the water to receive the harness" by which he was attached to a car in which he drew a young lady round the tank,—or to take his food. A specimen of *Delphinus tursio* which was for a time with him in the same tank, is said to have been even more docile than this remarkable animal.* The adult Beluga is pure white, and a "school" of these animals "leaping and playing in the calm, dark sea," is said to be a very beautiful sight. In summer the Greenlanders kill great numbers, extracting the oil and drying the flesh for winter use; in Russia, the prepared skin is much used for reins or other parts of harness requiring great strength and lightness. The length of the full-grown animal is about 16 ft., and its food consists of fishes, Crustacea, and Cephalapods.

The common GRAMPUS or KILLER (*Orca gladiator*, Lacépède), (fig. 48) is a well-known and widely dispersed species, being found in both the North Atlantic and Pacific Seas. Andrew Murray says "the common Grampus tumbles through the heavy waves all the way from Britain to Japan, *viâ* the North-west Passage." In the British seas it is frequently met with, and has occurred in several instances on the coast of Norfolk. This species is very fierce, its appetite insatiable, and carnivorous in the strictest sense of the word; to the Greenland and White Whale, as well as to porpoises and seals, it is an implacable enemy, and follows them ruthlessly. Dr. Brown says, "the White Whale and seals often run ashore, in terror of this cetacean, and I have seen seals spring out of the water when pursued by it. The whalers hate to see it, for its arrival is the signal for every whale to leave that portion of the ice." Eshricht took out of the stomach of a Killer, 21 ft. long, which came ashore in Jutland, no less than thirteen common porpoises and fourteen seals.

The rounded, compact form of this species gives the idea of great strength and swiftness, and the beautifully

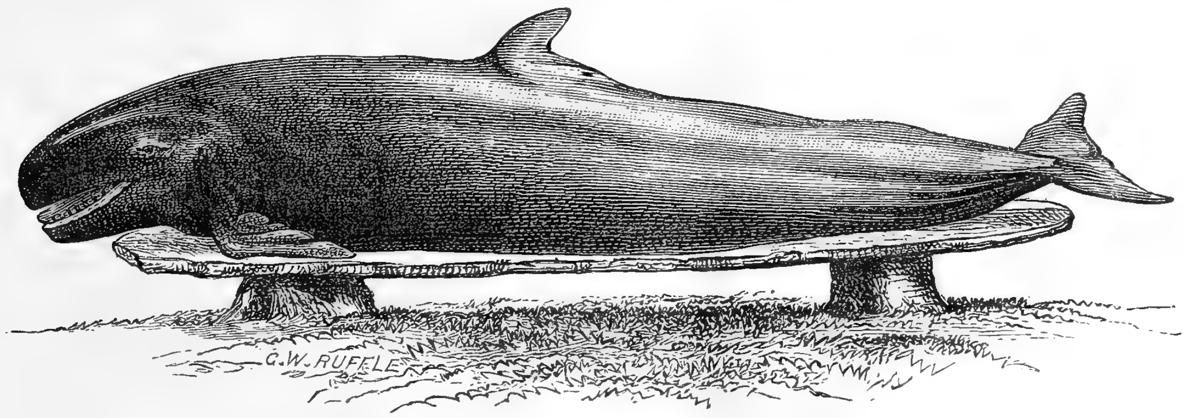

Fig. 49. *Pseudorca crassidens* (Reinhardt).

Fig. 50. Risso's Dolphin (*Grampus griseus*, G. Cuv.).

* Ann. and Mag. Nat. Hist., 3rd series, vol. 17, p. 312.

polished glossy black skin of the back contrasting with the equally pure and well defined white of the lower parts has a very striking effect; altogether it is a very handsome species, but there is something in its appearance which seems to indicate its cruel nature. The adult Killer measures about 21 ft. in length, the back is pure black, the under parts white, and over the eye is a well-defined white spot; there are thirteen or fourteen strong, slightly curved teeth on either side of both jaws; the flippers are broad and oval shaped, the dorsal fin high, particularly in the male.

As these papers are intended for the purpose of assisting in the identification of casual visitants to our shores rather than of giving anything like a history of the known British species of Cetacea, it may be desirable to mention here a very remarkable form, which although it has never been known to occur in the flesh on our shores, was first made known to science from an imperfect skeleton found in a semi-fossil condition beneath the peat in a Lincolnshire Fen. To this Dolphin "come back as it were, from the dead," and which forms a connecting link between the genus *Orca* and the genera *Grampus* and *Globicephalus* (and which Owen had named *Phocæna crassidens*), Reinhardt gives the name of *Pseudorca crassidens*. On the 24th November, 1861, a large shoal of these dolphins made their appearance in the Bay of Kiel, about thirty of which the sailors succeeded in separating from the remainder, but all, with one exception, escaped. This was a female 16 feet long, which after being exhibited at Kiel and other places, was bought for the collection of the University of Kiel. In the summer of 1862, three other individuals, presumably from the same shoal, were thrown ashore on the north-western coast of Zealand. Of the general appearance of this creature the accompanying figure (49), copied, by kind permission, from Professor Flower's translation of Reinhardt's paper read before the Royal Danish Society of Sciences in 1862, and published by the Ray Society, will give an idea; the figure is from a photograph of the Kiel specimen, and is not in the original paper. The length is from 16 to 19 feet; of the colour no account is given, but judging from the woodcut of the Kiel specimen it appears to be uniformly shiny black. The number of teeth differs in individuals, but in this one it was from 9 to 10 on either side of the lower jaw, and 8 to 10 in the upper. From the observations made by Reinhardt, he suggests the possibility that there may be "a difference in the sizes of the different sexes, and whether the females are not larger, but at the same time, perhaps, provided with a head comparatively smaller than that of the males." It is very suggestive of how little we know of the inhabitants of the sea, that at least one vast shoal of a species known only from its sub-fossil remains should be roaming the seas only to be accidentally discovered when its members became entangled in shoals from which probably many never lived to extricate themselves.

Risso's Dolphin (*Grampus griseus*, G. Cuvier) is a rare and little known species, which has been met with four times on the south coast of England and about eight times in France. In the "Transactions of the Zoological Society," for 1871, Prof. Flower gives an account of an adult female which was taken in a mackarel-net, near the Eddystone Lighthouse, on 28th February, 1870, and which eventually was sent up to London, when it was seen and described by that gentleman. About a month later, a second specimen was received in London, the precise locality of which was not known, but it was probably from somewhere in the Channel. This was also a female, but a very young animal, and as the adult female first taken had recently given birth to a young one, it is quite possible that it may have belonged to her. On the 26th July, a male of the same species was captured alive at Sidlesham, near Chichester, and sent to the Brighton Aquarium, where it lived only a few hours.

Risso's Dolphin varies very considerably in its colouration. The Sidlesham specimen was bluish-black above, and dirty white beneath; in the adult female described by Professor Flower (from whose illustration our figure is, with his permission, copied), "the head and the whole of the body anterior to the dorsal fin was of a lightish grey, variegated with patches of both darker and whiter hue. . . . Behind the anterior edge of the dorsal fin the general colour of the surface, including the dorsal and caudal fins, was nearly black, though with a large light patch on the upper part of the side directly above the pudendal orifice. The middle of the belly as far back as the pudendal orifice, was greyish white."* The most remarkable characteristic however, was the presence, scattered over the body, of irregular light streaks and spots, these markings extended from the head to within about two feet from the tail and presented a most singular appearance. In the young one the upper parts and sides of the body were almost black, the lower parts nearly white, the junction between the two colours being very abrupt and sharp. "On either side the body were six vertical whitish stripes nearly symmetrically arranged, and almost equidistant, being about six inches apart. They did not extend quite to the middle line of the body above, and were lost below in the light colour of the abdomen."† The length of the Sidlesham male was 8 feet, that of the adult female 10 ft. 6 in.; in the former there were present four teeth on each side the lower jaw, in the latter three only on each side, and in the immature specimen there were present seven teeth, four on the right, and three on the left side, the teeth are always placed in the front part of the mandible, and in every specimen exa-

* Trans. Zool. Soc., vol. viii., p. 3.
† l. c. p. 13.

mined there has been an entire absence of teeth in the upper jaw. In general appearance, Risso's Dolphin, more particularly the dark-coloured specimens, is said very much to resemble the next species (*Globicephalus melas*). Of its habits and distribution nothing positive is known, but from its visiting France or England in the spring or summer. M. Fischer "concludes that this species is migratory, visiting the shores of Europe in the summer, and passing the winter either to the south towards the coast of Africa, or to the west towards the American Continent." *

MICROSCOPY.

VOLVOX GLOBATOR.—It may be interesting to Microscopists to know that *Volvox Globator* can be found in considerable numbers—although so early in the year—in the large pond near Wandsworth Common Station. On Wednesday, Jan. 23rd, the Superintendent of the Sunday School here gave a treat to the children, and we arranged to make it both interesting and instructive. Having undertaken the Microscopic department, I was examining a bottle of fishings from the pond, and was surprised to find it contained *Volvox* in great plenty. To find it so early being quite new to me, I have inquired of several friends, but none of them had met with it at this time. Most of them seem to have imagined that it was useless to expect to find it till about the end of March. It may be that many others have not found it for the same reason; and a knowledge of the fact of its being obtainable now may be an addition to the Microscopist's pleasures. While examining a portion of the gathering, we were particularly struck with a fine specimen, containing no less than ten small ones enclosed. It rolled round with a motion so grand, that all who saw it were delighted. Suddenly, while watching it, it stopped for a moment, and then burst. Five of the little ones escaped from the parental envelope. There was a distinct pause between their liberation, and each came out with a sort of dizzy staggering movement, and then, after a momentary rest, would start off and commence to roll as if quite an old hand at doing it. The other five seemed to die, and make no sign. — *W. Winsford, Upper Tooting.*

CLEANSING OLD SLIDES.—In my paragraph on this subject, which appeared in the January number of SCIENCE-GOSSIP, p. 15, at line 4, instead of "*water*-glass," read "*watch*-glass." In line 7 put a full stop at "Benzole," and instead of "*and* use," read "*I* use."—*John Bramhall.*

IMPROVEMENT IN MICROSCOPE-STANDS. — Mr. George E. Fell, of Buffalo, has recently suggested a new addition to the microscope-stand. It consists of a finely-engraved scale on that part of the body of the stand which sides the limb. The latter can be furnished with a vernier, giving readings as close as may be desired.

PLANT-CRYSTALS. — At the last meeting of the East Kent Natural History Society, numerous drawings were exhibited of *Raphides*, and other microscopic plant-crystals, intended to be engraved on two plates of more than forty figures. They were the work of Prof. Gulliver, F.R.S., who gave explanatory observations thereon. Among these was the curious and novel description, that some trees and other plants, from stem to branches and leaves, are invested by a most delicate network, or tesselated pavement like mosaic work, of cells all studded with *sphæraphides*, so that each cell is set and adorned with a gem of one of these beautiful crystals. *Aralia spinosa* was said to form an example, beneath its bark or epidermis, of this external skeleton of crystalline tissue. And an internal crystalline skeleton was shown in other plants, including some *Leguminosæ*, as may be well seen in the common white clover; the crystals being arranged in chains along the vascular bundles. Mr. Gulliver remarked that boiling a portion of the plant, before its examination, in the solution of caustic potass which is kept by druggists, exposes the crystals very clearly. He added that he had learned that Mr. Hammond, of Milton Chapel, had found the long crystal prisms of *Iridaceæ*, &c., admirably suited for experiments on the polarization of light; and that the whole subject of plant-crystals belongs to the vast domain of the cell-biography of plants, hitherto sadly neglected, but which must be diligently cultivated before we can hope for the most complete system of botanical classification, and knowledge of the laws which govern the vegetable kingdom.

HABIRSHAW'S CATALOGUE OF THE DIATOMACEÆ.—Mr. Frederick Habirshaw, of 6, West Forty-eighth Street, New York, to whom I am personally unknown, has kindly sent me a copy of the above work, which supplies a want long felt by diatomists. To explain its plan and intention I cannot do better than quote the short preface. "The following Catalogue, made for private use, contains the references to the literature of the *Diatomaceæ*, published prior to May, 1877. At the suggestion of Prof. Hamilton L. Smith, of Hobart College, fifty copies have been reproduced by the Edison electrical pen process, for gratuitous distribution among those specially interested in this branch of natural history, and I trust the errors or omissions will not be found sufficient to impair the value of the Catalogue." The volume is a convenient quarto, 11 in. × 6 in., of some 270 pages, the first six containing a list of the principal writings relating to the *diatomaceæ*, the rest being devoted to the general catalogue. The genera and species are arranged alphabetically, and

* l. c. p. 18.

there must be considerably over 7,000 species enumerated, to each of which short but copious references are attached, as to where it may be found figured or described, the synonyms being also given. As far as I have been able as yet to verify these, they seem quite correct. Those who have been fortunate enough to receive a copy will, of course, show it to their friends, who will wish to obtain one also, and I fancy Mr. Habirshaw will be induced to print off a much larger edition, though, of course, not gratuitously, to supply the demand.—*Fred. H. Lang, Torquay.*

MICROSCOPIC LIFE OF THE CARBONIFEROUS LIMESTONE.—At the last meeting of the Chester Society of Natural History, Mr. G. W. Shrubsole, F.G.S., read a lengthy and interesting paper on "The Microscopic Life of the Mountain Limestone (*foramenifera, radiolaria, entomostraca, polyzoa*, &c.)." The various objects described had been chiefly obtained from the mountain limestone of North Wales and the neighbourhood.

ZOOLOGY.

TURNING AN ENEMY TO USE.—The United States Entomological Commission, which was organized for the purpose of investigating and reporting on the entire subject of insect ravages throughout the western regions of the United States, have discovered, by means of chemical analysis, that dead locusts will furnish a new oil, which will be christened *caloptine*, and a very large percentage of pure formic acid. Though this acid exists in the ant and some other insects, it is with difficulty obtained in large quantities; whereas, by the action of sulphuric acid upon the locust juices, it passes off with great readiness and in remarkable quantity and gravity. The uses of this acid, as a therapeutic, are capable of great and valuable extension, where it can be obtained so readily and in such quantity.

THE RED-THROATED DIVER.—When visiting in Shetland two years ago, I had a capital opportunity of witnessing the nesting of the Red-throated Diver (*Colymbus septentrionalis*). Having been informed by a Shetlander that the aforesaid bird had frequented a certain loch the previous year, I was determined to walk over thither, a distance of about six miles. Accordingly I set out, but, in crossing the mountains, encountered a very heavy shower of rain, which continued for the space of about an hour; nevertheless I succeeded in seeing the object of my expedition. When on the summit of a mountain near my journey's end, I descried the loch, and also the Diver swimming leisurely about. This, however, proved to be the male, for, on walking round the margin of the loch, I saw the female sitting on her nest with outstretched neck. She permitted me to approach within about four yards of her. When I had stood for five or six minutes to admire her beauty, she suddenly dived from the nest, and all my efforts to see her afterwards were unavailing. The nest was nothing more than a slightly hollow depression on the very edge of the loch, and contained but one egg, of a more elongated form than usual, of a dark brown colour, sparingly spotted with black.—*C. D. Wolstenholme.*

RARE BIRDS SHOT.—Lately there have been the following rare birds shot:—A Merlin (*Falco Æsalon*), shot near Wetherby on the 16th December, 1877; a Bittern (*Botaurus stellaris*), shot at Castle Howard, on the 26th of the same month; and a Pied Water Rail (*Rallus aquaticus*), shot in Ireland in January, 1878. The latter has a great quantity of white on the back; the top of the head and neck have also a little white about them. There is a little white on the tail, and the tertials are nearly pure white.—*P. Thompson.*

ST. MARY, LAMBETH, FIELD CLUB.—This most useful and unostentatious Natural History Society was originated about six years ago by the Sunday School teachers of the parish, who have been very successful in diffusing and popularising a love of natural history. It includes about thirty members, of whom Arthur Eve, Esq., is president, and Mr. G. Masters secretary.

THE BIRDS OF COSTA RICA.—At a recent meeting of the Zoological Society of London, Mr. A. Boucard, C.M.Z.S., read a paper, in which he gave a list of the birds he had collected during a recent expedition to Costa Rica. The number of birds collected during his five months' stay was about one thousand in number, representing two hundred and fifty species, amongst which were two new to science (*Zonotrichia boucardi* and *Sapphironia boucardi* of Mulsant) and many others of great rarity.

"SPONSA'S HEADQUARTERS."—I find I made two mistakes in my article. They both occur in the list of *Diurni* at the end of the article:—*Aglaja* should be omitted; and, for *Artaxerxes*, of course *Agestis* should be put. At the time I wrote the paper I was much occupied with *Artaxerxes*, and suspect that was the reason of the mistake.—*Hastings C. Dent.*

BOTANY.

THE INFLORESCENCE OF GOURDS.—The gratification which I feel at the interest excited by my note on the inflorescence of gourds and pumpkins is tempered with regret at finding that I did not express myself with sufficient clearness to be understood by your correspondents, who seem to think that I had said that fertile blossoms were expanded before any staminate flowers had appeared on the same plant;

which indeed was not my meaning. My observations do not at all contradict those of Mr. Beal. What I notice as remarkable is this:—In regular indefinite inflorescence, when a flower appears in the axil of every leaf, the flower in the axil of the lowest leaf is the oldest, and therefore opens first; then, that in the axil of the leaf next above it; and so on, as in the pimpernel. In gourds and pumpkins, this order of expansion is observed only among flowers of the same sex. Suppose, then, that a plant bear ten flowers, the first nine of them may be staminate flowers, the tenth, pistillate. If a flower open every day, as is usual in our climate, the fertile flower would not open in the ordinary course till the tenth day. Instead of that, however, it will be found expanded on the fifth and sixth; it may be simultaneously with one of the staminate flowers or not, but always before the staminate flower immediately below it. Flowers of the two sexes, though indiscriminately mixed as to position on the stem, thus form two series as to the order of their expansion. I think that there are usually more staminate flowers produced early in the season, and a tendency afterwards to the production of pistillate flowers which are abortive for want of vigour in the plant to perfect them. I only remember one instance of a gourd producing a fruit blossom too early in the season to be fertilized: it was a miniature gourd, which produced a fruit, as the result of that blossom, with no seed.—*John Gibbs, Chelmsford.*

ASPLENIUM SEPTENTRIONALE AND GERMANICUM.—About ten years ago I found *Asplenium septentrionale* in the Beddgelert district. There were a great many plants growing within a limited area, but the spot was very difficult of access, and it was, perhaps, owing to this that they had escaped observation. I brought away four or five specimens, and took fronds from some other plants, but they were *all septentrionale.* I did not look specially for *Germanicum,* certainly, but, as far as my observation went, there was not a plant of it there. At the same time I quite agree with the observer whose opinion Mr. T. Belt quotes, that a very close relationship exists between these two species.—*Edward Hart Vinen, M.D.*

GENTIANA ACAULIS.—In the Autumn of 1875, I was staying, after illness, at the Freshwater Hotel, Isle of Wight, and, during my first ramble over the Downs, I gathered two species of *Gentiana,* which I sent to my friend Mr. Varenne, of Kelvedon, who has a fine collection of British plants, and is a first-rate botanist. After reading the communication in your last, about the appearance of *Gentiana acaulis* in that locality, I wrote to Mr. Varenne to let me know what species I sent him, and I enclose his answer:—"Dear Dr. Bree, I am much afraid the lady who wrote in SCIENCE-GOSSIP made a mistake about the *Gentiana acaulis* in the Isle of Wight. You collected two specimens of gentian there, in September, 1875, as forwarded to me. One was a stunted state of *Gentiana Amarella,* and the other, equally dwarf, was a specimen of *Gentiana campestris,* probably. Both are many-flowered, and by that character very different from *Gentiana acaulis.—E. G. Varenne.*"—*Dr. Bree.*

GENTIANA ACAULIS.—I would beg to remind your correspondent, "J. C. M.," with reference to some remarks inserted in your recent issue, that the flowering of plants vastly depends upon *climatal influences.* There is no reason because *G. acaulis* blossoms on the Swiss Alps towards the middle of June till July, that therefore it should flower here at that time; the conditions are totally dissimilar. Many years ago I noticed several blossoms of this lovely plant, in a friend's garden in East Sussex, during the month of September. It has been stated that "Alpine flowers are signalized by the intensity of their colours, this increase of brilliancy in tints being attributed to the pure snow-water nourishing the roots, to the greater excitement of the light, and refined purity of the air." Not only so, there are other forces at work which should cause an earlier floral development. They get a longer and more persistent rest in winter, and protection from the carpet or blanket of snow. During my travels in Italy, in February and March of 1865, vegetation appeared to be most backward; but on my return home by Florence, in early April, the vegetable world was in full luxuriance of leaf and beauty. Whilst journeying over the Mont Cenis pass, numerous flowers were in full bloom, some peeping through patches of snow, others in places where it had melted. Nothing of the kind existed out of doors in England. If indeed *G. acaulis* blossoms with us in June and July, as it is said to do on the Alps during those months, the remarks by Treviranus, quoted by Dr. Lindley in his "Theory and Practice of Horticulture," might hold good:—"It is well known that plants from the northern half of the world, when they have become naturalized in the south, have changed almost entirely the time of their vegetating, blooming, and fruit-bearing, so as entirely to accord with the habits of the indigenous plants of the country. Thus we find at the Cape of Good Hope oaks, alders, almond, peach, and apricot are in full bloom in August." Our best botanists, such as Mr. Bentham, I believe, maintain that *G. acaulis* is not indigenous here; so it might obey the dictum as laid down by Treviranus.—*John Colebrook.*

GENTIANA ACAULIS (S. G. 1878, p. 18).—I hope your fair correspondent, Isabella H. Knox, will not be offended if I tell her in your pages that *Gentiana acaulis* is not found wild in the Isle of Wight, and that the plants she found between the Needles and Freshwater were not Gentians at all, but dwarfed specimens of *Campanula glomerata.* There can be no doubt about it. Bromfield, in his "Flora Vic-

tensis," says of the plant, "on Freshwater Downs in various places, as near the Needles Hotel and Lighthouse, but scarcely an inch high, being browsed down by sheep"; and he further adds in a note at p. 291, "On the bleak and lofty Downs, at the western extremity of the island, this species scarcely attains an inch in height, and specimens from thence were *actually described and figured by Withering* ("Arrangement of British Plants," 3rd ed. ii p. 282, and pl. xi., fig. 5) *as a new species of Gentian*, and named by him *G. collina*." I. H. K. may therefore console herself that others before her have been deceived by the same plant at the same place.—*Wm. Marshall, Ely.*

Side Lights on the Compositæ. — A most suggestive paper on this subject appears in the last number of the *Journal of Botany* by Dr. Masters. It is based on a specimen of *Helenenium autumnale*, in which all the florets appeared stalked and bearing opposite leaves on the stalks, the whole forming a corymb of flowers instead of the ordinary capitulum of a composite.

British Marine Algæ.—Mr. H. Goole (Plymouth) desires us to correct a few mistakes which appeared in his communication on the above subject in our last issue, p. 40. For instance, instead of *Dasya pumicea* it should be *D. punicea*; for *Dudrisinia dudrisnagra* there should have been *Dudresnaia dudresnagia*.

GEOLOGY.

Important Paper on the Geology of Western Scotland.—At a recent meeting of the Geological Society of London, Prof. Judd, F.R.S., read a most important and highly interesting paper on Scottish geology. During the seven years in which he has been engaged in the study of these interesting deposits, the author has been able to prove that not only is the Jurassic system very completely represented in the Western Highlands, but that associated with it are other deposits representing the Carboniferous, Poikilitic (Permian and Trias) and Cretaceous deposits, the existence of which in this area had not hitherto been suspected; and by piecing together all the fragments of evidence, he is enabled to show that they belong to a great series of formations, of which the total maximum thickness could have been little, if anything, short of a mile. The relations of the scattered patches of Mesozoic strata to the older and newer formations respectively, are of the most interesting and often startling character. Sometimes the secondary rocks are found to have been let down by faults, which have placed them, thousands of feet below their original situations, in the midst of more ancient masses of much harder character. More usually they are found to be buried under many hundreds, or even thousands, of feet of Tertiary lavas, or are seen to have been caught up and enclosed between great intrusive rock-masses belonging to the same period as the superincumbent volcanic rocks. Occasionally the only evidence which can be obtained concerning them is derived from fragments originally torn from the sides of Tertiary volcanic vents, and now found buried in the ruined cinder-cones which mark the sites of those vents. In some cases the mineral characters of the strata have been greatly altered, while their fossils have been occasionally wholly obliterated by the action of these same igneous forces during Tertiary times. In every case, the survival to the present day of the patches of Secondary rocks can be shown to be due to a combination of most remarkable accidents; and a study of the distribution of the fragments shows that the formations to which they belong originally covered an area having a length of 120 miles from N. to S., and a breadth of 50 miles from E. to W. But it is impossible to doubt the former continuity of these secondary deposits of the Hebrides with those of Sutherland to the north-east, with those of Antrim to the south, and with those of England to the south-east. From the present positions of the isolated fragments of the Mesozoic rocks, and after a careful study of the causes to which they have owed their escape from total removal by denudation, the author concludes that the greater portion of the British Islands must have once been covered with thousands of feet of secondary deposits. Hence it appears that an enormous amount of denudation has gone on in the Highlands during Tertiary times, and that the present features of the area must have been, speaking geologically, of comparatively recent production—most of them, indeed, appearing to be referable to the Pliocene epoch. The alternation of estuarine with marine conditions, which had, on a former occasion, been proved to constitute so marked a feature in the Jurassic deposits of the Eastern Highlands, is now shown to be almost equally striking in the Western area; and it is moreover pointed out that the same evidence of the proximity of an old shore-line is exhibited by the series of Cretaceous strata in the West. Although the comparison and correlation of the Secondary strata of the Highlands with those of other areas, and the discussion of the questions of ancient Physical Geography thereby suggested, are reserved for the fourth and concluding part of his memoir, Prof. Judd took the opportunity of making reference to several problems on which the phenomena now described appear to throw important light. In opposition to a recent speculation, which would bring into actual continuity the present bed of the Atlantic and the old Chalk strata of our island, he points to the estuarine strata of the Hebrides, as demonstrating the presence of land in that area during the Cretaceous epoch. He also remarks on the singular agreement of the conditions of deposition

of both the Silurian and Cretaceous strata of the Scottish Highlands and those of the North American Continent. But he more especially insists on the proofs, which we now have, that the Highlands of Scotland, as well as the greater part of the remainder of the British Islands, were once covered by great deposits of Secondary strata, and that the area has been subjected to enormous and oft-repeated denudation. He dwells on the evidence of the vast quantities of material which have been removed subsequently to the Mesozoic and even to the Miocene period, and he maintains the conclusion that many, if not all, of the great surface-features of the Highlands must have been produced during the very latest division of the Tertiary epoch, namely the Pliocene.

THE FOSSIL FUNGUS.—I have frequently observed that, in being called upon to answer criticisms of my work, I have more commonly to reply to statements I have never made (or even thought of) than to defend the position I have really taken. In your January number (p. 21) P. Martin Duncan combats the idea that Peronosporites "is perhaps the oldest fungus on record." I have never made any such statement, so I need not reply. Your correspondent then quotes instances of Algæ being found in older rocks than the Palæozoic, but as my description refers to a fungus, and not to an alga, the instances brought forward by P. M. Duncan, though of the greatest value and interest, refer rather to true algæ than fungi, *i.e.*, if the distinguishing characters between the two, and now generally received, are to hold good. The letter in your February number (p. 41), signed "John Butterworth, Goats Shaw, Oldham," is of a very different character, and hardly demands an answer. This gentleman writes to "dispute" my "claim to its discovery," because he "discovered" it (*i.e.*, the Peronosporites), and read a paper upon it (at Manchester) which was not published. Now, I have never set myself up as the "discoverer" of the fossil fungus; I claim to be nothing more than the humble drudge who pored over the fungus preparation for some weeks, made out the structure of the mycelium and fruit, its affinity with living plants, and then attempted a description and illustration. If J. Butterworth did all this in 1874-5, I regret, with him, that some permanent record was not made of his work "in some leading journal." In my paper I distinctly stated that Mr. W. Carruthers, F.R.S., the Keeper of the Botanical Department of the British Museum, was the "discoverer" of the plant, as he certainly was—and something more. The parasite has been known by this gentleman for many years. J. Butterworth states that a member of his Society identified his fungus "as Peronosporites" in 1874-5. How this learned "member" did so, I am at a loss to know, as *no such genus as Peronosporites existed* before last year, when the name was given by me to the parasite in question. I have certainly had something more than a "casual" view of the slide, as I have had it in my own house for six months, and have it now.—*Worthington G. Smith.*

THE FOSSIL FISHES OF SUSSEX.—At a recent meeting of the Eastbourne Natural History Society, Dr. Ward read a paper on "The Fossil Fishes of the District." They are met with chiefly in the Upper and Lower Chalk strata of the Downs at Holiwell; others in the Greensand and Gault; and a few in the Wealden beds. Dr. Ward's paper was illustrated by specimens.

NOTES AND QUERIES.

THE IMPORTATION OF HUMBLE BEES INTO NEW ZEALAND.—Perhaps some of your correspondents could give some valuable hints as to the best method of importing humble bees into New Zealand. The farmers there are anxious to introduce them, as they are said to be necessary for the successful cultivation of clover, which they aid by carrying about the pollen. An attempt was made, I understand, to bring over a number of the insects, but they all died an the way, and it has now been proposed to bring over the eggs. But if, as I believe, the larvæ are hatched in cells, and fed by the parent bees until entering the pupa-state, this idea would not seem to promise better success than the former. Could the perfect insects be transported in a torpid state? Or would it be possible to naturalize them by introducing the pupæ? I hope some practical solution of the question may be given by some contributor.—*Charles B. Moffat.*

CRAYFISH IN CUMBERLAND.—Some of the small runners into Croglin Water, a tributary of the Eden, abound with crayfish. I had many opportunities of seeing them last spring. The inhabitants of the district have a legend that the "crabfish" were introduced by some member of the Featherstonhaugh family, but so long ago that I could gather no precise information as to the date. I think it improbable that they are indigenous, but not knowing anything of their geographical distribution, I shall be glad of any information on the subject.—*W. Duckworth, Grey-street, Carlisle.*

NATTERJACK TOAD ON THE SHORES OF THE SOLWAY FIRTH.—While staying at Bowness on Solway in August last, I found quite a colony of the Natterjack. On one part of the shore, where the ground was damp, nearly every stone of moderate size I turned up had a natterjack below, sometimes two. There was no mistaking it, the yellow line down the back being ample means of identification. It would be interesting to know if ever it has occurred thus far north before, as I was under the impression that it belonged only to the east and south of England.—*W. Duckworth, Grey-street, Carlisle.*

THE PIGEON A POLYGAMIST.—In Mr. Dixon's interesting account of the pairing instinct of birds, he says, "I have once observed the rook practising polygamous propensities. We have a pigeon of the 'horseman' variety which is a confirmed polygamist. I observed this during the course of last summer repeatedly." Is this peculiarity in the pigeon known to ornithologists as a common or uncommon occurrence? Does this present to view an inherited energy, or only applicable to the surrounding circumstances?—*M. King.*

QUERY RESPECTING SEA-ANEMONES. — Sea-Anemones, like other animals, require to "be fed." But, unlike most other domestic animals, this need not be done daily. Once a week will do in most cases, though some like it oftener; but if it fouls the water more harm than good will accrue to the animals by over-feeding. No doubt they derive some nourishment from organisms in the water, but these should be microscopical, and not perceptible, *i. e.*, the water should *even be sparklingly clear and colourless;* if not, there is something wrong. Find out the cause of this, and set it right without changing it: time and patience alone will often effect this. Or it may be aërated or circulated without changing. In no case change it, unless it has become chemically poisonous. Organic impurities can always be got rid of by oxygenation, or a process known as cremacausis, or burning up. Thus, living animals give out carbonic acid gas, and certain effects of food, which, if allowed to accumulate, generate carburetted or sulphuretted hydrogen. But living plants take up these poisonous gases (assimilate the carbon to build up their tissues), thereby rendering them harmless, and liberate the free oxygen again for the animals to breathe. This goes on ceaselessly under the action of light, and this balance of animal and vegetable life is the grand governing principle of all aquaria, great or small. If W. T. H. C. Trome wishes to keep a scientific aquarium, he will remember this, and *never change the water.* He will thus be able to keep his animals more happily, healthily, and easily. But the anemones must be fed. Mussel or oyster flesh is best, handed to each individual by a pair of wooden forceps, in pieces varying in size from a pin's head upwards, say, to a quarter of a mussel, according to the size of the anemone; experience will soon show how much. Under proper conditions this is nearly all assimilated. If it is rejected, perhaps the pieces are too large, or the water too hot or too cold, or the animals too crowded,—most probably the latter with beginners. The thing is to find out how many animals will live and flourish in a given space: keep these and no more. If oysters or mussels or fish cannot be easily procured for food, butcher's meat will do, but not so well. Much depends upon the *distribution* of the water. The smaller the depth in proportion to the size of the animals the better; because the greater the surface aëration, and, as oxygen is perpetually wanted for the animals to breathe, and to purify the water, the more regular the supply the better. This may be accelerated by stirring in air, say, with the stick of a camel's hair pencil, this may be done daily, especially so the day after feeding, to prevent or dissipate any cloudiness in the water. The brush at the other end will be useful to pick up any refuse bits, and skim off the mucus which otherwise collects round the base of most anemones, and would in a state of nature be washed away and dissipated by the waves. We collect them into a cup of water, and throw them away, and thus prevent the accumulation of untidiness, in small domestic aquaria of still water. In large aquaria, as at the Crystal Palace, impurities are dissipated by a ceaseless flow of water from tank to tank, down to the underground reservoir, to be pumped up again fresh and clear for ever; and I know of no cheaper or better guide than the sixpenny and twopenny handbook to this successful institution; but if W. T. H. C. Trome will state his aquarium dimensions and difficulties, we may be able to tell him more in SCIENCE GOSSIP. Hardy anemones are about the easiest animals to begin with. Ours live and flourish, year after year, in shallow tanks, or glasses, commercially known as "anemone pans," or pastry pans. In all cases growing plants cannot be dispensed with, and *spontaneous vegetation* is found best, because best suited to each separate situation. To prevent this growing to excess, and causing the water to become green, avoid too much direct daylight, by using blinds or screens. Blue paper will sometimes serve sufficiently.—*G. S.*

BOTANICAL LOCALITIES.—The following is a fairly accurate description of the localities inquired for by Mr. H. Morton, in the January number of SCIENCE GOSSIP:—Shotover Hill is $2\frac{1}{2}$ miles E. of Oxford; Cowley is a village not far from the latter place, 2 miles S.E. of Oxford; Bagley Wood lies $2\frac{1}{2}$ miles to the S. of Oxford and 3 N. of Abingdon; Wychwood Forest (Winchwood being apparently a misprint) lies 14 or 15 miles to the N.W. of Oxford (nearest station, Charlbury, on the Oxford and Worcester line); Cornbury Park is situated at the N.E. corner of Wychwood Forest, and half a mile S. of Charlbury station. I have been unable to discover the exact situation of Cornbury Quarry, but presume it must be in the immediate neighbourhood of the Park. Sunninghill Wells is in the extreme S.E. corner of Berks., 6 miles S.S.W. of Windsor, 6 W. of Egham, $7\frac{1}{2}$ E. of Wokingham, and nearly a mile from Ascot station. Most of these places are, as Mr. Morton says, good localities for plants (I know nothing about insects), and he may perhaps be interested to know what plants may be found there. The following are the names of a few, which I give partly from my own observation, partly from "Walker's Oxfordshire Flora." Shotover Hill, *Polemonium cæruleum*, *Drosera rotundifolia*, *Gentiana Amarella*, *G. campestris*, *Trifolium subterraneum*, *Habenaria bifolia*, *H. viridis*, *Epipactis palustris*, *Cephalanthera grandiflora;* Cowley, *Geranium rotundifolia*, *Pinguicula vulgaris*, *Anagallis cærulea*, *A. tenella*, *Fritillaria meleagris*, *Orchis conopsea;* Cowley Bog is also very rich in *Scirpi*, *Carices*, &c.; Bagley Wood, *Iris fœtidissima*, *Convallaria majalis*, *Luzula congesta*, *Neottia nidus-avis;* Wychwood Forest, *Asperula cynanchica*, *Atropa Belladonna*, *Orchis pyramidalis.* If Mr. Morton wishes to learn more about the good botanical localities in this neighbourhood, I shall be very happy to correspond with him.—*H. W. Trott*, 24, *Walton-street*, *Oxford.*

ENTOMOLOGICAL AND BOTANICAL LOCALITIES. —(Reply to H. Morton.) (Winchwood should be Wychwood; Sunninghill Wells should be Sunningwell Hill.) Four of the places inquired for are within a short distance of Oxford—say two to four miles Shotover and Cowley are on the Oxfordshire side of the Thames valley; Sunningwell and Bagley Wood on the Berkshire side. Shotover may be reached by rail to Wheatley, whence a pleasant walk of five miles over the hill to Oxford. Sunningwell and Bagley form part of an ironsand range of hills bounding the Thames valley, between Abingdon and Oxford, and are easily accessible from Radley station. Cornbury Park and Wychwood Forest adjoin Charlbury station on the West Midland line, about twenty minutes' ride per rail from Oxford.—*E. C. Davey*, *Wantage.*

FAIRY FLAX (No. 158, p. 44), and *Fairy Lint*, are names which, according to Johnston, in his "Botany of the Eastern Borders," are given in the border-land to *Linum catharticum*, *L.* The district comprehends "Berwickshire, the Liberties of Berwick, N. Durham, and the immediately adjacent parts of Northumberland and Roxburghshire." I should think the name, "Fairy Flax," is given to this

pretty little plant merely from its delicate appearance, being, in fact, a miniature or fairy imitation of the common flax in everything but the colour of the flowers. Still there may be some legend connecting it with the fairies, and, if so, I shall be much obliged to any correspondent who can furnish me with any folklore of Fairy Flax illustrative of its name or otherwise. "E. L. S." may be interested to know its other English names, though, as far as I am aware, it has fewer than most British plants. Gerard calls it *Mill Mountaine*, which Prior, in his "Popular Names of British Plants," derives from the Lat. Cha-*mœl*-inum *montanum*, Gr., *χαμαι-λινον*, Ground-Flax. In Cumberland, Shropshire, and Cheshire it is called *Mountain Flax*, being frequent in hilly and mountainous districts; and in the latter county it is also known as *Purging Flax*, a translation of its scientific name, or *vice versâ*, and it is so called from its reputed cathartic properties. In Cheshire, however, I have found that herb-doctors are not very particular what the effects of a herb may be, so long as it *is* a herb, and they generally administer it as a stomachic on account of its bitter taste.—*Robert Holland.*

The Nebular Theory.—It has been discovered by M. Cailletet, and M. Raoul Pictet that our air can produce water; they have also converted oxygen and nitrogen into liquids, and have produced a vapoury cloud from hydrogen, under great pressure and excessive cold. Under the nebularh ypothesis of Laplace, the origin of water is nowhere satisfactorily accounted for. Mr. Proctor has told us that it is to all intents and purposes demonstrated that the nucleus of this earth was formed from a nebulous condition. The German astronomer, Gruithuisen, adopting the same primary condition, formed this earth by the slow aggregation of cold matter, leaving the water origin unaccounted for. By this new discovery, it seems that all the conditions for producing the water were present under the latter system. The light and heat had not penetrated the nebula; there was therefore intense cold, as there is now in the air above us and at the sea-bottom. As the solids of the nebula slowly condensed, they caused great pressure. As the gases are expressed now in water from the earth, so we may infer that they were at the beginning. In *The Mail* of January 9th, 1878, I find, "It is only a question of carrying these experiments further in order to reduce these liquid gases to the solid form." We have then a nebulous mass filling the whole space now occupied by the atmosphere, the water, and the solid earth. Under the universal law of gravitation, the heaviest molecules of the mass subsided towards their centre—as these molecules condensed, they produced pressure. Hence we have the result in our quasi-solid earth, the water resting on it, and the air enveloping the whole, the entire system resulting naturally from the nebulous mass, the sunlight and heat reducing or refining the atmosphere to its present condition by causes well known.—*H. P. Malet*, 8, *Via Venezia*, *Florence*.

Harebell (No. 158, p. 47).—There are two good reasons why this name should not be derived from the hairlike stalks upon which the flowers hang. The first is that the spelling "Hairbell" is of comparatively modern introduction, inasmuch as the older writers, such as Gerard and Parkinson, spelled it "Harebell," though it must be confessed that the spelling of the older herbalists does not go for very much. The second reason is that when those old writers do make use of the name, they are not speaking of *Campanula rotundifolia*, but of *Scilla nutans*. When the name was transferred in books from *Scilla* to *Campanula* I am not aware. Some choose to spell the word "Airbell," from the supposition that it refers to the colour of the flowers being similar to the air or sky; but the same objections apply to this also—the first does, at any rate. As a matter of fact, however, the name Harebell or Hairbell is not the name in most general use, except in books, for either plant. In fourteen different stations in England and Scotland I only have Hare—or Hairbell recorded for *Campanula* in three, viz., Yorkshire, Cheshire, and the West of England; and in twenty-five counties I have the name applied to *Scilla* in but one, Devonshire. Lyte is, I think, the oldest writer who gives an English name to *C. rotundifolia*, and he calls it "Blewbelles," which is still one of its commoner names, but which is also as often given to *Scilla*. It would seem, then, that *Scilla nutans* is the original "Harebell"; that it was "hare," not "hair"; that the name has been transferred to *Campanula rotundifolia*, and the spelling altered in some cases in order to account for the name, because its stalks are delicate and hairlike. I do not possess a copy of Gerard to refer to, but it is possible he may say why *Scilla* is called "Harebell."—*Robert Holland.*

Pairing Instinct of Birds.—As to the question of birds using the nests of other species, and why not of the same species? It will invariably be found that the selected nests are old ones, and belong to birds who only once use them for their purpose. In the case of the House Sparrow using the nest of the Martin, the bird has utilized it for its purpose, in the absence of the Martins, and, upon their return, keeps possession of the nest by "force of arms," and consequently compels the rightful owners to build elsewhere. I may also mention that sparrows may be found breeding the year throughout, and retain their old nests in many, if not all cases. There is a stately fir-tree in my neighbourhood containing several sparrows' nests. They have been there for several years, and I have not the least doubt but they have been tenanted by the same pairs of birds, as the nests are always equal in numbers, and should one of the nests be destroyed, it will again be built in a more inaccessible situation. Now, if birds used the nests of their own species indiscriminately, their ranks would be fraught with strife and discord, which I have, as yet, failed to observe. All birds would consequently strive to obtain an old nest, rather than be at the trouble of constructing one for themselves; fierce combats would prevail, and then, no doubt, the "survival of the fittest" would in one sense be correct. Again, all birds work as influenced by their respective instincts. The Martin, having once constructed its abode, remains, through the agency of instinct, at rest, as far as nest-building is concerned, until that structure is damaged, or forcibly taken from it, as in the case of the sparrow, when it must repair its handiwork, or make new quarters elsewhere, if not able to repel the aggressor. How can we explain, except through this peculiar instinct, the annual return of the same number of birds, and the little wanderers alighting upon their temporary homes shortly after their arrival; or, if their nests have been destroyed, clinging to the old sites, and, as the breeding season arrives, constructing new nests on the ruins of the old ones? A word as to the circumstance mentioned by your correspondent, "G. T. B." I have no doubt that he is quite correct in believing that the pair of blackbirds laying in the same nest three successive years is one and the same pair. But did not the nest undergo repairs? I have never known a nest of this bird, however compactly built, be fit for its purpose again, even the next season, let alone three successive seasons.

However, as no such instance has come under my own observation, I decline making further remarks on such instance. The blackbird pairing with the song-thrush, if correct, is no doubt a very exceptional occurrence, and can only be explained as a monstrosity, which this, and all similar instances, undoubtedly are, and which, however unexplainable, are repeatedly found in various birds and animals. I will also mention the fact, that the pairing of annual birds is not so closely linked with the vernal year as is currently supposed. The hedge-sparrow, through what I have observed, invariably pairs late in December. A few weeks prior to that date the birds are solitary; they gradually become more social, and very garrulous; and now, at the time of writing this, all specimens seen are invariably in pairs. I think Mr. Parsons somewhat mistakes my object in saying, "the only way is by polygamy." I do not for a moment entertain the idea that *all* birds could multiply quickly by practising it, but only those which I have stated (first section of gallinaceous birds), and for what that gentleman brought forward the human race as examples, bearing on the present subject, I am at a loss to imagine. As to polygamy occurring in species under domestication, I ask why the domestic swan (*C. olor*) remains in a strictly monogamous state for life, although, in many cases, the males must be in the minority. I have known a case where three of these birds were kept (two females and one male). Now, the male bird paired with one of the females and remained united to her, and never bestowed any of his affections upon the more unfortunate female. Ducks always show a polygamous instinct when in confinement, if the females do *not* exceed the males. Again, the domestic pigeon, though the females may far exceed the males, a polygamous instinct will never be manifested, the male birds pairing in due season, and assisting to rear their offspring with as much care as the female birds. It must also be remembered that the males of polygamous birds are invariably of bright, if not conspicuous colours, while the females closely resemble the colours of surrounding objects. The males, too, are the best eating, invariably the largest, and consequently the most liable to capture, and the most prized as articles of food; while the females are more often rejected, or never discovered in their haunts. It will thus be seen that the females would exceed the males, and, did no such polygamous instinct exist within them, circumstances the most disastrous would arise with deadly certainty to their race. Thus, I again say, that through one of the wisest provisions of nature, these birds are able to afford us sustenance, and at the same time maintain their position amongst their congeners in the struggle for existence.—*Charles Dixon, Heeley, near Sheffield.*

THE PAIRING INSTINCTS OF BIRDS.—Seeing something in January part of SCIENCE-GOSSIP, about the pairing instinct of birds, I thought the following might be interesting. About April of last year I had a brood of chickens, and amongst them I reared one duck. When they grew old enough I killed all the cocks except one, for which one the duck has shown a strange attachment, following it all about. The cock has reciprocated and continued this *sexual* attachment, showing a decided preference for the duck over the hens. I have, unfortunately, lost the duck, but the night before, the cock, instead of going up to roost beside the hens, as it generally did, slept on the ground beside the duck. It is impossible now to say what would have been the result of their attachment; but perhaps some of your readers would say whether they have observed the like.—*John Baillie, Sunderland.*

HERRINGS.—Can any of your numerous readers inform me, what are the signs by which some fishermen know where large bodies of herrings are swimming, even when their boats are sailing rapidly through the water?—*J. W.*

DREDGING.—Would some of your correspondents be so kind as to give me some information on dredging not far from the shore, also as to what books would be useful in determining the objects I am likely to find?—*R. G. C.*

CURIOUS MODES OF BLOSSOMING.—I have in my garden here a Rhododendron which grows near the house, and is sheltered by it from the south and west, but has no shelter from the north or east. For the last three years it has blossomed about this time of the year (January). There have been several flowers this year, but all on the same side of the tree, and near together. Last year they were on the other side, towards the house, and were a little earlier (at Christmas), and less numerous, but this year there is no shelter whatever from the north and east. The flowers are a beautiful pink, like the flowers on the same tree in the summer. There is also a yellow jasmine, which grows in the drawing-room balcony, now in blossom, and neither of these plants has any sun during the winter, and not much in the summer, owing to their position.—*L. T.*

CAVES IN SOMERSETSHIRE.—Nearly all that is known of these caves is summarised in Mr. H. B. Woodward's "Memoir on the Geology of East Somerset, and the Bristol Coalfield," published in 1876 by the Geological Survey; but as "Somersæta" and other readers of SCIENCE-GOSSIP may not have access to such expensive luxuries as Survey Memoirs, I venture to offer a brief epitome of the subject. The Lamb Cavern near East Harptree is now closed. It seems to have been artificial, but was fully described in Collinson's "History of Somerset" (1711). In Burrington Combe are several caverns, four of which, viz., Aveline's Hole, Plumley's Den, Whitcombe's Hole, and the Great Goatchurch Cavern in Lower Twinbrook Ravine, were explored by Professor Boyd Dawkins and Mr. W. A. Sandford. (Geol. Mag. vol. ii. p. 43; Rep. Brit. Assoc., 1864; Proc. Somerset Arch. and Nat. Hist. Soc., part ii., vol. xii. p. 161.) They obtained remains of sheep, ox, reindeer, roe-deer, ibex, goat, mammoth, bear, water-vole, wolf, fox, badger, rabbit, hare, pig, mole, birds, and, in Aveline's and Whitcombe's Holes, of man. The human bones encrusted with stalagmite were evidently buried. There are, or were, also caves in the Carboniferous Limestone at Weston-super-Mare, Loxton, the western end of Banwell Hill, and near Hutton. At Uphill there are caves in the same formation, in which remains of mammoth, deer, rhinoceros, wolf, ox, horse, bear, otter, pig, hyæna, fox, polecat, water-vole, mouse, birds, and man, have been found. (Pooley, Geologist, vol. vi. p. 331; E. C. H. Day, Geol. Mag., vol. iii. p. 118; W. W. Stoddart, Proc. Bristol Nat. Soc., vol. v. p. 37.) There are several caverns at Cheddar, but Cox's is, though not large, perhaps the most beautiful in England from its stalactites. Bones of bear, deer, ox, horse, and man, were recorded from a cave on the summit of the Mendips here, by Mr. Long, in 1838. (Brit. Assoc. Rep. 1838, p. 85.) Wookey Hole, near Wells, more correctly spelt Okey (from British *ogo*, a cave), is only second to the Peak Cavern in Derbyshire in point of size, being nearly six hundred feet long, and, in one

part, eighty feet high. It is in the Dolomitic Conglomerate of the Trias. Messrs. Dawkins and Sandford found here bones of hyæna, lion, bear, wolf, fox, mammoth, two species of rhinoceros, horse, Irish deer, red deer and reindeer, and human implements of flint, chert, and bone, of contemporary date. (Dawkins, Q. J. G. S., vol. xviii. p. 115; vol. xix. p. 260, Proc. Somerset Arch. and Nat. Hist. Soc., vol. xi., part ii., pp. 197–219; and Geol. Mag., vol. ii. p. 44.)—*G. S. Boulger.*

THE FURNITURE BEETLE.—I can mention another instance of destruction to furniture by the "furniture-beetle." Two years ago I found them working and living in the frame of a sofa that has been about thirty years in my possession. The sofa was taken out of the house, and during three days was frequently brushed with very strong carbolic acid. Last week I examined it, and found fresh borings of this pest. The sofa has a beechwood frame, 1 in. thick and faced with mahogany half-inch thick. The insects have not touched the mahogany, but in many places have bored close up to it. I am now having the beechwood removed, and mahogany substituted. Can anything be devised (short of destroying the wood) that would kill these destructive insects? I fear that their habits render liquid applications unable to touch them or their eggs.—*T. Hughes.*

THE FRESHWATER AQUARIUM.—Scarcely a number of SCIENCE-GOSSIP appears but contains queries or notes on the above subject; and, judging from some of these queries and the replies to them, aquarium-keeping on a small scale would appear to the tyro an extremely difficult task. We are told ("Ben Plant," July, 1877) to limit the plants to three species, molluscs to two, and reptiles to exclude entirely. Others have complained of sticklebacks eating all their snails, and of killing each other. My own opinion is that there is nothing in connection with practical natural history involving less trouble than aquarium-keeping. In giving this opinion, it is true that it is not the result of so many years' experience as some of your correspondents can boast, but it is based upon seven or eight years' successful work. With regard to the vessel which is to constitute the aquarium, I believe this to be of minor importance, and that, so far as the inhabitants are concerned, a washing-tub will serve as well as an elaborately constructed plate-glass tank, though, of course, the latter is the best adapted for observation. I think the chief charm (and use also) of an aquarium lies in the fact that we see various creatures living under natural conditions. To make the conditions as natural as possible, I would introduce most of the inhabitants of an ordinary pond; the exceptions would be only such species as prey inordinately upon the others. Such, as the aquatic coleoptera and hemiptera, and the larvæ of dragon-flies. I would admit all the pond gasteropods; the two species of newts (*cristatus* and *punctatus*), and I certainly have not found it necessary to limit the species of plants. The larvæ of the caddis-flies are interesting and amusing, and I certainly cannot agree with "S." as to the difficulty of rearing them to their final stage. The aquarium must have walls, and as the caddis-worms have legs, they can therefore have no difficulty in reaching the surface. It is no uncommon thing, at the proper season, to see several escaped caddis-flies hovering about my aquarium. "P. E. C." is troubled because the sticklebacks eat his snails. His best plan would be to feed the fish with small worms, until the snails have had time to increase in number; this they will soon do at such a rate as will defy the most voracious stickleback. Difficulties of this kind only occur at starting; things soon right themselves, and the "balance of power" is maintained. "S." thinks sticklebacks are the most troublesome inmates of an aquarium. I would substitute "interesting" in place of "troublesome," and I think Mr. Scott (Jan., 1878) has given "S." the correct reason of his failure in keeping them. I believe that all these difficulties are caused by having the inmates unnaturally select. With a plentiful and varied supply of vegetation, a host of Entomostraca and Infusoria will be introduced, which will form an inexhaustible food supply to the fish. The decaying plants and animal exuviæ will form a fine mud at the bottom, in which the pretty little bivalve, *Cyclas cornea*, annelids, &c., will find a congenial home. The water should not be changed or disturbed. In spite of the mud the water will neither be turbid nor odorous, and the student can observe the habits of the inmates under natural conditions. An aquarium, so conducted, may not look so ornamental as an elegant glass vase with a floor of scrupulously clean gravel, above which two or three lazy gold-fish are slowly swimming round a solitary plant; but it will afford the microscopist or biologist excellent opportunities of study.—*Edward Step.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

W. WAKEFIELD.—Your mosses are:—1. *Hypnum undulatum*; 2. *Neckera crispa*; 3 and 4. *Hypnum sericeum.*

W. A. C.—Your specimens are:—1. *Physcia parietina*; 2. *Evernia prunastri* (both lichens); and 4. *Hypnum squarrosum* (a moss).

F. T. M.—Your moss is *Hypnum confertum.*

M. SKILTON.—Your specimens are:—1. *Hypnum riparium*; 2. *Bryum capillare*; 3. *Hypnum rutabulum.*

J. C. JOHNSTONE.—Your specimens are:—1. *Dicranella heteromalla*; 2. *Rhacomitrium heterostichum*; 3. *R. ellipticum*; 4. *Orthothecium rufescens*; 5. *Bryum crudum*; 6. *B. bimum*; 7. *Rhacomitrium lanuginosum.*

G. S.—Apply to the London Stereoscopic Company, Regent-street, London; or to James How & Co., 5, Bride-street, London; or C. Baker, 244 and 245, High Holborn, London; or J. H. Steward, 406, Strand, London, and inform them of the kind of lantern slides you require.

C. SWATMAN.—The article you refer to has not yet appeared.

C. HARRIS.—The following are the names of the zoophytes sent:—1. *Flusta*? 2 and 3. *Sertularia polyzonia*; 4. *Sertularia operculata*; 5. *Antennularia antennina.*

A. W. P.—We do not think your chrysalides will harm under the circumstances.

A CONSTANT SUBSCRIBER.—A facsimile reprint of Walton's "Compleat Angler" has been issued by Messrs. Eliot Stock. Frank Buckland's "Popular History of British Fishes" is cheap and good. Couch's "British Fishes" is our best and largest book on the subject.

T. Q. C.—The fungus is called *Peziza aurantium.*

J. K.—Your sponge specimen is *Halichondria* (or *Chalina*) *oculata.*

THE BOTANICAL EXCHANGE CLUB.—Those members who may be still waiting for return parcels are requested to bear the delay, which has been owing to the severe illness of the Secretary. No time will be lost in distributing the parcels as soon as possible.

W. B.—The present address of the South London Entomological Society is the South Metropolitan Temperance Hall, Blackfriars-road, S.E.

K. D. (Almondsbury).—Your shells are: 1. *Clausilia laminata*; 2. *Balia perversa*; 3. *Cochlicopa lubrica*; 4. *Bulimus*; 5. *Pupa marginata*; and 6. *Succinea putris.*

J. SIMS.—The "coloured matter" sent was doubtless iron oxide, produced perhaps by the decomposition of the argillaceous carbonate of iron nodules often so abundant in the coal measures. The piece of limestone shale is of carboniferous age, and is impressed with *Producta*, *Orthis*, and *Rhynconella.*

R. M. CHRISTY.—We have no doubt that a published list of British marine shells for labelling cabinet specimens, &c., may be had of Van Voorst, publisher. A cheap book on bird and animal stuffing is that published by F. Warne & Co., price one shilling.

H. Haines.—Your shells are all correctly named, and many of them are most excellent examples of their kind.

G. A. Holt.—The object on *Briza media* was not a fungus, but looks like one of the pollen masses of an orchid, transferred by some insect.

J. Tempere. — The micro-fungus on leaf of *Lavatera sylvestris* is *Puccinia malvacearum*, Corda.

F. C. Kelland. — Your micro-fungus is *Phragmidium mucronatum*, Fr., see Dr. Cook's "Rust, Smut, Mildew, and Mould."

Geo. Clinch.—The fragment of fossil wood sent appears to be from the Portland beds, but it is impossible to tell from such a small piece. The fossil from the chalk is not a tooth, but part of an encrinite.

T. W. B.—The drawings sent us for identification are:—No. 1. *Pleurosigma*; 2. *Stephanodiscus*; 3. *Amphora ovalis*; 4. is not a diatom; 5. *Globigerina* is an interloper. It certainly did not live with the diatoms, which are all fresh-water forms.

J. Cunnack.—Masters's "Vegetable Teratology" was published by the Ray Society.

A. B. C.—*Marchantia* should be pronounced *Markantia.*

EXCHANGES.

Send mounted or unmounted material (good) for various Diatomaceous Earths, to W. Wood, 25, Gower-street, W.C.

Monotropa hypopitys offered for 3, 13, 14*b*, 15, 33, 38, 96, 104, 111, 116, 117, 151, 162, 187, 195, 209, 216, 220, 222, 227, 251*b*, 275, 287, 343, 351, 379, 452, 466, and 474; and *Crithmum maritimum* for 411, 413, 414, 415, 421, 422, 436, and 469.—E. W. Andrews, University School, Hastings.

Several duplicate slides, well mounted, Diatoms *in situ*, fruited Marine Algæ, Holothuria plates, and other interesting marine objects; some choice unmounted material in Diatoms, Foraminifera, Zoophytes, Holothuria, Algæ, &c. &c. Wanted, Magic Lantern, first-class Slides, or Cash. Will send mine on approval.—T. McGann, Burrin, Ireland.

For exchange: 690 foreign stamps (in book), all different, of 95 countries, and all genuine. Wanted, Lepidoptera or Eggs.—R. McAldowie, 82, Bonaccord-street, Aberdeen.

Will exchange washings from the London Clay containing Foraminifera, Entomostraca, &c., or select specimens of larger Fossils, for Bell's "Monograph on the Malacostracous Crustacia," Part I. London Clay.—W. H. Shrubsole, Sheerness-on-Sea.

Dr. Partridge, of Stroud, will exchange Science-Gossip for 1877 for well-mounted micro slides of parasites,—fish especially wanted.

Duplicates.—Missel Thrush, common Snipe, Water Hen, Bald-headed Cock Peewit, Pheasant, Blackbird, Song Thrush, and Greenfinch in exchange for other eggs; side-blown eggs only accepted.—John Thorpe, 2, Spring-gardens, Middleton, Manchester.

For seeds of Blue Gum (*Eucalyptus globulus*) send stamped envelope to C. P. Ogilvie, Sizewell House, Leiston, Suffolk.

Eight years' Science-Gossip, newly half-bound in leather, for good slides or micro apparatus.—R. Bridger, 23, Oxton-road, Birkenhead.

Diatoms, twenty-one fossil and sub-fossil earths (material) from various parts of the world. Good recent Diatoms wanted (material), marine species preferred. Send list to W. M. Paterson, Westfield-terrace, Loftus.

Wanted, a half-inch objective o 40 degrees, with or without adjustment, made for binocular, in exchange for one of about 80 degrees, with adjustment.—W. H. P., 255, Milkwood-road, Herne Hill, S.E.

Orthosira arenaria, Foraminifera, Post Pliocene, and from Turkish coast, Froghopper, section of Pith of Arabia, *Nipnobdus lingua*, spores of *Platycerium alcicoma*, and section of Cane. Wanted, objects mounted or unmounted in exchange for above.—T. Watson, Bank Parade, Burnley.

For *Aregma bulbosum* send stamped directed envelope and object of interest (Fungi preferred) to Chas. Williams, Kingmeade, Woolcott Park, Redland, Bristol.

Malayan and Himalayan Ferns offered in exchange for other kinds from Africa or other parts.—J. N., 14, York-road, Brighton.

Wanted, Lepidodendrons and other stems from the carboniferous system in exchange for geological, physiological, and other well-mounted slides. — M. Fowler, 20, Burn-row, Slamannan, N.B.

7th London Catalogue: Nos. 171, 812, 1071, 1074, 1463, 1492, 1600, and 1605, and others, for Nos. 3*c*, 4*b*, 6*b c*, 23, 2, lists exchanged. — C. A. O., 75, Mildmay-road, Highbury London, N.

Will forward Packet of Sand containing Foraminifera on receipt of two penny stamps.—Geo. Clinch, West Wickham, Kent.

London Catalogue, 7th edition: 121, 122, 130, 183, 201, 217, 238, 328, 330, 346, 363, 533, 539, 542, and others. Send list to Edwin Hepworth, 17, Spring-lane, Lees.

Teeth of *Saurichthys acuminatus*, and other small teeth (named), from the Rhœtic bone-bed at Aust Cliff, to exchange for tertiary fossils, Barton series preferred.—Rev. K. Deakin, Almondsbury, Gloucestershire.

Send good slides or material for Siliceous Foraminifera, fossil (rare), or Sucker-foot of *Acilius sulcatus* (beetle).—Wm. J. Fuller, Broad Plain Soap Works, Bristol.

J. W. Bulmer, South Parade, Northallerton, Yorks, will send, post free, 50 varieties of rare Foreign Stamps for British Birds' Eggs.

Exchange.—British and Foreign Shells, Fossils, Minerals, and polished specimens of Madrepones, for Dudley and other Trilobites.—A. J. R. Sclater, 4, Bank-street, Teignmouth.

Exchange.—Can occasionally send Octopus, Squid, Cuttle-fish, and a great variety of marine animals to parties who will exchange for the same.—A. J. R. Sclater, 4, Bank-street, Teignmouth.

Zonites purus, *Z. fulvus*, and a few *Rotundata* (var. *Alba*), also a few Birds' Eggs, for British Marine Species or Foreign *Helices*.—Thos. Hedworth, Dunston, Gateshead.

Good Slides offered for unmounted material; specially wanted, Parasites and Eggs of Parasites, Eggs of Lepidoptera, &c., also British Polyzoa, Biccellaria, Cillata.—J. D. Pepper, 15, Talbot-street, Moss Side, Manchester.

For a Slide of Crystals for Polar send two good Prepared but Unmounted Entomological Objects to Wm. Sargant, Jun., Caverswall, Stoke-on-Trent.

For sound pieces of Wood 8 by 6 by 4, showing bark on one side, of No. 46, 295, 297, 299, 382, 480, 482, 516, 616, 621, 830, 848, 1125, 1201, and 1203, I will give in exchange rare British plants or micro slides.—J. Tempere, 23, Croucy-street, Colchester.

Will send specimen of *Ptychogaster albus* (microscopical fungus) for good plant, moss, or microscopical material.—F. Crosbie, The Chestnuts, Barnet.

Wanted, recent Diatoms from Monterey Bay and Cuxhaven Mud, Diatomaceous Earth from Stoneyford, County Antrim, and well-mounted slides offered in exchange.—William A. Firth, Whiterock, Belfast.

Will exchange Book on Diatoms by Prof. A. Mead Edwards, cost 3s. 6d., for some back numbers of Science-Gossip or unmounted micro objects.—E. V., 41, Peckham Grove, S.E.

The beautiful Green Lizard, *L. Viridis* (living), in any number. Open to offers.—J. Sinel, Bagot, Jersey.

In exchange for any other Mounted Objects, Proboscis of Blow Fly, *Pleurosigma angulatum*, *Amphipleura pellucida*.—Address, T. C. Maggs, Yeovil.

Wanted, Gosse's Works on "Marine Natural History," in exchange for Botanical Works.—C. A. Gwines, 8, Crafford-street, Dover.

Wanted, Cuticles, Insects, &c., prepared for mounting, for other material. 200 oz. covers, glass, cheap.—Tylar, 165, Well-street, Birmingham.

Send well-mounted 3 by 1 Slide for a sample of Diatomaceous Tripoli.—T. Brown, 7, Spencer-street, E.C.

British Coleoptera. Exchange correspondents wanted.—James Walkden, 183, Broad-street, Pendleton, Manchester.

Melicerta ringens, exchange for living Sea Anemones (*actinia*) or *madrepores*, or good mounted micro object.—H. E. Forrest, Lloyd's Bank, Aston-road, Birmingham.

Living or mounted specimens of *Volvox globator* in exchange for good mounted or unmounted objects.—John Levick, Limetree Villas, Albert-road, Aston, Birmingham.

BOOKS, &c., RECEIVED.

"Accidents in Mines." By Alan Bagot. London: C. K. Paul & Co.

"Industrial Art." February.

"Land and Water." February.

"Journal of Applied Sciences." February.

"Chambers's Journal." February.

"Science pour Tous." January.

"Botanische Zeitung." January.

&c. &c. &c.

Communications have been received up to the 12th ult., from:—W. H. G.—T. S.—T. B. W.—F. W. E. S.—H. V.—P. T.—J. D.—J. M. M.—E. W. A.—C. P. O.—Dr. B.—W. D.—S. A. B.—A. S.—A. M. Mc.A.—Dr. E. H. V.—R. Mc.A.—J. W. B.—Dr. C. R. B.—E. C. R.—J. R. J.—M. K.—J. G.—C. B. M.—C. D. W.—T. Mc.G.—G. R. V jun.—J. B.—C. D.—R. G. C.—R. B.—G. S.—L. T.—T. W. D—R. M. C.—T. H.—C. S.—H. L.—W. T. V. D.—W. M. P—H. P. M.—J. R. J.—W. L. B.—H. E. W.—W. W.—G. G—W. M.—V. C.—W. A. C.—C. H. H.—J. W.—W. G. S—C. A. O.—W. H. P.—E. C. J.—T. W.—J. A. M.—M. F—J. B.—C. F. W. T. W.—W. W.—A. F. G.—R. H. K.—H. G.—Dr. P.—G. O. H.—A. W. S.—E. T. M.—W. H. S.—Major L.—H. G.—C. A. G.—E. C. D.—R. E.—A. S.—Di de C.—A. K.—A. W. P.—W. E. G.—E. W. W.—J. C.—V. G—F. C. M.—G. S.—C. W. C.—D. S.—F. C.—H. W. T.—H. C. D.—E. V.—W. T.—C. A. G.—J. W.—W. A. F.—H. E. F.—A. B. C.—H. A. M.—W. S. jun.—W. C.—J. Y.—A. J. R. S.—W. B. G.—H. K.—W. J. F.—C. P.—H. F. B.—J. H. H.—G. N.—K. D.—J. D. P.—W. W.—J. W. B.—J. H. J.—A. J. R.—T. Q. C.—J. M. M.—J. K.—&c. &c.

REPORT OF SCIENCE-GOSSIP BOTANICAL EXCHANGE CLUB.

IN approaching this subject it is pleasant to say we have in a measure succeeded beyond our expectations, but we should have been still more successful and have been able to send more of the marked desiderata, had we been supported in our efforts by more of our working or rather collecting botanists. Evidently it was regarded solely as an *Amateur Club*, so that one of the rules seemed to be totally overlooked in so far that a lot of specimens were sent such as *Bellis*, *Leontodon*; in fact, some few parcels contained only such as could be gathered in a field a few yards from our door. Another year, we are satisfied, all this will be changed for the better.

A few contributors have kindly sent short notes upon any specimens thought to be unusually rare: these we give below. We also name a few good things which we have had great pleasure in distributing:—*Ranunculus floribundus*, Bab., common in the Tweed district. Some of our plants approach *elongatus*, others *triphyllus*, and *confusus*.—A. B. *Ranunculus salsuginosus*. This form is frequent in the river Tweed.—A. B. *Ranunculus fluitans*, Newb., river Lathkill, Derbyshire.—C. B. *Draba muralis*, plentiful in cultivated ground (nurseries), to which it has been introduced about Kelso and Melrose, Roxburgh.—A. B. *Raphanus maritimus*, Lizard Point, Cornwall. We supplied about one half of the parcels with this rare species. *Dentaria bulbifera*, High Wycombe.—T. E. D. *Viola Curtisii*, Lytham.—J. C. M. *V. amœna*, Bishop Auckland.—J. P. S. *V. lactea*, Helston, Cornwall.—J. C. *V. Curtisii*, Land's End.—J. C. *Silene quinquevulnera*. Introduced to the Tweed district.—A. B. *Circœa alpina*, *β. intermedia*, Gaitheugh, Berwickshire, where it is abundant: along with it I observed a few patches of *C. lutetiana*, possibly true "*or typical*." *Alpina* grows there also, but I did not detect it.—A. B. *Rubus cæsius*, var. *pseudo-idæus*, Springwood Park, Roxburgh. Various forms of *Rubus cæsius* are plentiful in the district, but I have seen this only from the above locality.—A. B. *Rosa pomifera*. On the roadside at the highest part, above Sweethope, Roxburgh: one of the bushes is a fine old plant about 7 feet high, and as much through. They are as far as possible, under the circumstances, from any house or garden, being about halfway between two farm-places. I have never seen it in a garden in the district.—A. B. *Rosa Watsoni*, also common in the Tweed district, and, like *Rosa subcristata*, very variable.—A. B. *Rosa subcristata*. This variety is common in the Borders.—A. B. The fruit of *Watsoni* can scarcely be confounded with any other species, when once recognized. *Alchemilla conjuncta*, Buttermere Fells, Cumberland.—R. W. Upon writing to Mr. W. respecting this locality, which is open to doubt, he informed us the specimen sent was cultivated in his garden, but was originally brought from Buttermere by a friend of his in the North of England. Not the least doubt, however, exists as to its being the true *conjuncta*, and if the locality is also a genuine one, it is one of the most important discoveries our contributors have brought to light this season. We may also add, the leaves are at least one-third larger than the plants we have inspected at Kew and Benthall Hall. *Medicago lappacea*. I have found a few specimens of this species on Tweedside every year, for the past five seasons. It grows in company with the other Medics (*M. denticulata*, *M. maculata*, and *M. minima*), along with which it has been introduced to the district with wool.—A. B. *Trifolium Molinierii*, Lizard Point.—J. C. *T. strictum*, Lizard Point.—J. C. The above clovers are old friends. It is pleasing to know they still retain possession of the old station, from which they were recorded many years ago. *Sarothamnus prostratus*, Lizard Point.—J. C. *Helianthemum canum*, Great Orme's Head.—C. B. *Ribes alpinum*, Rokeby, Teesdale.—J. P. S. *Spergularia marginata*, Arnside.

—C. B. *Callitriche autumnalis*, abundant in Yetholm Lock, Roxburgh. Although it has not been recorded, so far as I am aware, from the Till or the Tweed, judging from the large quantity that is annually, after every high wind, carried into the Bowmont, and thence to the Till and the lower reaches of the Tweed, it will very probably be found there also.—A. B. We believe this was recorded by Dr. Johnstone several years since. *Lamium intermedium*, a rare weed in cultivated ground about Kelso.—A. B. *Scrophularia Scorodonia*, Penzance. —J. C. *Pulmonaria officinalis*, some very large patches in Makerstown Woods, Roxburgh. Probably a remnant of monkish cultivation.—A. B. *Veronica peregrina*, a garden weed, at New Louden, Berwickshire.—A. B. This plant is rapidly spreading: it seems but a few years since it was named by Prof. Babington, from specimens then discovered near Perth. *Rumex rupestris*, Helston.—J. C. *Polygonum littorale*, Link, *P. Raii*, both gathered at St. Bees Head.—C. B. *P. arenastrum*, Bor., St. Bees Head.—C. B. *Orobanche cærulea*, St. Owen's Bay, Jersey.—G. C. D. *O. rubra*, Gunwalloe.—J. C. *Allium triquetrum*, Helston.—J. C. *Goodyera repens*, Bowmont Forest, Roxburgh. — A. B. Plentiful in many Scotch Fir woods in both Roxburgh and Berwickshire. Most likely it will also be found in similar situations in Northumberland; indeed, I have found it within three miles of the borders of that county. Owing to the increase of plantations, this plant has increased rapidly of late in this district. The *Goodyera* appears to have been one of the original natives of the Borders when this part of the country was covered with forest. When the land was cleared, it, and others of a like nature, would disappear and remain in a dormant state, until circumstances rendered the soil again suitable for their existence. *Cephalanthera grandiflora*, High Wycombe.—Mrs. T. E. D. *Erica tetralici-ciliaris* Penryn, Cornwall. —J. C. *Cuscuta epithymum*, Kingswood-heath, Surrey.—J. L. *Crocus nudiflorus*, Derby.—W. H. P. *Impatiens parviflora*, Ockbrook, Derby.—W. H. P. *Potamogeton nitens*, Web. Abundant in the Tweed and Teviot, in the counties of Roxburgh, Berwick, and Northumberland (Cheviotland). Like others of the genus, it is variable. The description of *P. nitens* in "Student's Flora" says the leaves are recurved,—surely a misprint for incurved.—A. B. *Potamogeton zosteræfolius*, Spondon, Derbyshire.—W. H. P. *P. lanceolatus*, River Lligway, Anglesea.—C. B. This is another record for a very old station, originally made public in Davie's "Welsh Botanology." *Plantago Timbalii*, Mullion, Cornwall.—J. C. We believe this has not hitherto been noticed in the above county. *Veronica triphylla*, York.—H. R. M. *Mellittis mellissophyllum*, Beeralston, Devon.—W. H. *Carex humilis*, Leigh Woods.—W. G. *C. filiformis*, abundant in Lurgie Loch, Berwick; Prins-de-bog, Roxburgh; and Campfield Bog, Northumberland.—A. B. Wherever this species is met with, it is generally abundant; such is our limited experience. *C. digitata*, near Tintern Abbey, Monmouthshire.—C. B.—*C. ornithopoda*, Cresbrook Dale, Derbyshire. —C. B. Three of our contributors send a limited supply of the above novelty. It will doubtless be new to most of the members. *Carex punctata*, Gaudin. Ledges of perpendicular rocks in the Waterwinch, Tenby.—C. B. We hope again shortly to refer to this species; the fruits have been submitted to Dr. Syme. *Cyperus longus*, Rennoch Valley.—J. C. *Juncus pygmæus*, Lizard Down.—J. C. We are glad to be able to supply the whole of the members with this species, which is, comparatively speaking, a recent addition to the British Flora. *Scirpus parvulus*, mouth of Ovoca, Arklow.—C. B. *Kobresia caricina*, Widdy Bank, Teesdale.—J. P. S. *Leersia oryzoides*, Woking, Surrey.—H. E. W. It is but seldom good specimens of the *Leersia* can be secured; nearly all we have seen have been imperfect: the few we have on this occasion distributed are excellent examples. *Bromus Lloydianus*, near Lizard Point.—J. C. *Ophioglossum ambiguum*, St. Martin's, Scilly Isles.—J. C.

A total of forty-four parcels of plants were sent out. In each case we made as good selection as was within our power.

DOES DESICCATION KILL DIATOMS?

A COMMUNICATION on the above subject, by M. P. Petit, was made to the Société de Botanique, Paris, and as the subject is of considerable interest to the diatomist, we have much pleasure in reproducing it.

"As the heat of summer dries up the ditches, pools, and puddles, one sees that when the last trace of humidity vanishes, the diatoms with which they were stocked also disappear. But when the rains of autumn and winter refill the places we have indicated, the diatoms revive and soon reappear in great numbers.

For some years I have gathered with care the dried surfaces of the ditches in which I knew that great quantities of diatoms existed, in the hope of finding traces of spores or zygospores. I, however, never found anything but empty frustules mixed with the soil that had served as a substratum. Never being able to find traces of spores, the idea occurred to me to make experiments on the diatoms when placed under the same conditions as occur in nature. I therefore collected, at divers periods of the year, the diatoms, with their substratum of mud or clay, and submitted them to desiccation in the sun, placing the material in glass vessels covered, to keep them from dust, some for six, and others for eight months.

The desiccation was such that the deposits at the

bottom of the vessels were cracked in every direction. In the month of September last (1877) I examined some fragments of these deposits. I saw that the frustules were there, and also that they were transparent and apparently empty. But on making a more careful examination, I saw in the interior of one of the extremities, in a majority of frustules, some brown granules, which I considered were the remains of the dried endochrome.

The vessels were then filled with distilled water sufficiently aërated by prolonged agitation; after this they were exposed to the direct heat and light of the sun.

During the first two or three days there appeared but little change in the frustules, but on the fourth day the large brown granules had augmented in size, and had taken the yellow tint characteristic of the diatomaceous endochrome. In following from day to day the augmentation of the plasma, I remarked that on or about the fifth day this nearly filled the middle of the frustule, and on the eighth day it had assumed the normal form peculiar to the genus to which the species belonged. The naviculas had resumed their curious movements, and some days later it became evident that a number of the frustules had commenced to multiply by self-division.

In the presence of these observations, we are able to conclude that the diatoms, like many other of the lower organisms, preserve the vegetative force in spite of desiccation. At the same time I observed a circumstance which deserves mention. In one of the vessels a large number of diatoms were attached to the sides of the glass: in these the endochrome never returned to its normal condition. It is probable that the plasma had been killed by too rapid a desiccation, while the diatoms on the surface dried less rapidly as the substratum slowly lost its humidity: the plasma was, therefore, able to contract slowly; thus preserving the power of returning to life under the influence of favourable conditions. It seems, therefore, necessary, in order that the diatoms should preserve their vegetative force, that the desiccation should proceed slowly; and that is exactly what takes place in ditches and pools. After these facts, it is easy to comprehend why, during the wet season, we are able to find, almost directly, the diatoms for which we have searched in vain during the drought."

(*Note by Translator.*—These experiments will, I think, not only account for the rapid reappearance of the diatomaceæ in dried-up pools when these were again refilled, but will also explain their presence in such habitats as the moss on the trunks of trees, roofs of cottages, or the damp places near leaky water-butts or tanks. The *débris* from the dried-up ditches is raised by the wind as fine dust, and carried, perhaps, miles away, and after a time deposited in the localities just alluded to; the presence of moisture not only soon restoring their vegetative power, but enabling them to reproduce by self-division.

Those who have examined gatherings from the previously-named sources have, no doubt, been struck with the absence of the larger forms: these have, probably, been eliminated by their rapid subsidence, owing to their much greater weight.)

Norwich. F. KITTON.

PRIMITIVE MAN: HIS TIMES AND HIS COMPANIONS.

By the Rev. J. Magens Mello, M.A., F.G.S.

IN the history of almost all nations there is a point at which that history loses itself in tradition and myth, a point at which we should be left in impenetrable darkness were it not for the new light that has been shed, at any rate, upon the past history of man in Europe by the discoveries of the still young science of Geology. When we attempt to trace back the history of the human race in England, which we may take by way of example, the earliest historical records carry us back to the period of the Roman Conquest; the writings of the Roman Tacitus, and of some other authors of that epoch, show us more or less distinctly what kind of a country this was, and of what sort the inhabitants were which they found in possession; and there history leaves us. We must look elsewhere for any further information. That information lay buried for long centuries beneath the earth: in mounds, in caves, in gravel-pits the footprints of primitive man were left for the explorers of the 19th century to track and to interpret.

During the last fifty years evidence has been fast accumulating, showing us that long ages must have elapsed, ages marked by many changes, since man made his first appearance here; evidence slowly received indeed at first, but which has yet surely made its way, forcing upon us the belief that long before the Romans visited our shores, generations after generations of men had come and gone, men to whose eyes was presented a very different England to that with which we are acquainted, men who had as their companions animals very different to those with which we are now familiar. What that England was probably like, what those animals were, and what little we know about those men is the subject of this present sketch.

Many ages before the Romans came there was a time when England, instead of being an island, together with Scotland and Ireland, formed part of the continent of Europe; there was then no Bristol Channel, no Irish Sea, no Straits of Dover, no German Ocean such as we now have them; we must picture to ourselves a northern and western extension of the Continent with a great river, an enlargement probably of the present Rhine, flowing northwards through a wide valley or plain, where is now the sea. Into this river flowed, as tributaries, the Thames and

Humber and other streams; dense forests, wild moorlands and heaths, great swamps and morasses, diversified doubtless in places by green pastures, stretched far away inland from this great valley, as well as from others on the south and west of England. In those early ages, no mild winters were known, though probably the summers were far hotter than any which we now experience. We may even imagine, if we will, snow-covered mountains, with their glaciers creeping down into the valleys, in which the snow would lie thick as winter drew on, whilst the rivers would be sealed up by ice. We may picture to ourselves the animal life of that period. It is winter; from the northern hills and forests come travelling southward, driven by the excess of cold, animals now called Arctic; and in the valleys and amid

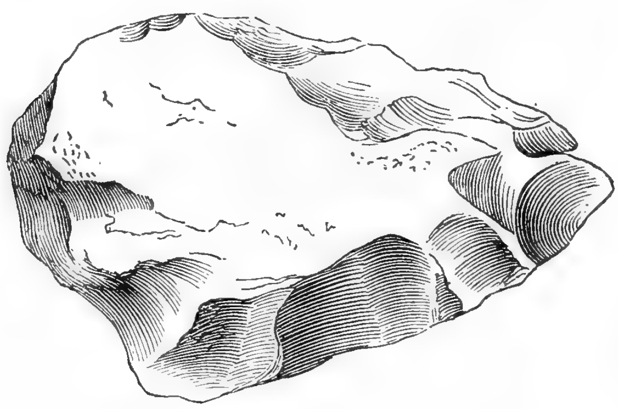

Fig. 51. Flint Implement from Brandon; $\frac{1}{3}$ nat. size.

the woods of middle and southern England might have been seen the herds of rein-deer, the gigantic shaggy-maned mammoths with their huge recurved tusks, smooth-skinned but woolly rhinoceroses, great bears, wolves, and foxes, crafty gluttons, troops of wild boars and other animals. Spring and summer draw on, and as these animals begin to move once again to more northern pasture-grounds, we find with the increasing warmth an influx of other visitors, strange, indeed, to England now,—lions and tigers, and leopards, hyænas, hippopotami, elephants, and other species of rhinoceroses; and thus, in the strange climate of those days, might have been witnessed a continual swinging to and fro, and an intermingling for a time, of Arctic and southern animals, who made this country their home, and many of which were even born here, and here lived and died. Do any ask, how do you know all this? is not all this a mere idle dream? Let us, then, record some of the evidence. These animals have left us their remains to this day; in many a brick-field and gravel-pit, in the soil of numerous caverns, their bones, nay, occasionally even their complete skeletons, have been found, and no chance accumulation this, no stray bones are these, washed in by some great flood or floods from distant regions. The evidence shows that many of these bones were deposited in the very spots near to which these animals died. Sealed up in the floor of many a cave are these relics of the past, not water-worn and rubbed, but fresh and sharp as to all their angles, sometimes also bone lying close beside its bone, as though quietly dropped and covered up where found, as must, indeed, have been the case, almost immediately after death. Our cave floors give us proof also that many of these animals, the rein-deer, hyænas, mammoths, and others, must have been born in this country. In the same bed, lying side by side, we have found the young and the old, the rein-deer and its fawn, the hyæna and its cub, the young as well as the old elephant or rhinoceros, and a very brief examination of the contents of some of our caverns will demonstrate these facts; we may not only see the jaws, for instance, of the old hyæna with the teeth worn by hard work almost to the gums, but also those of the young animal, in which the permanent

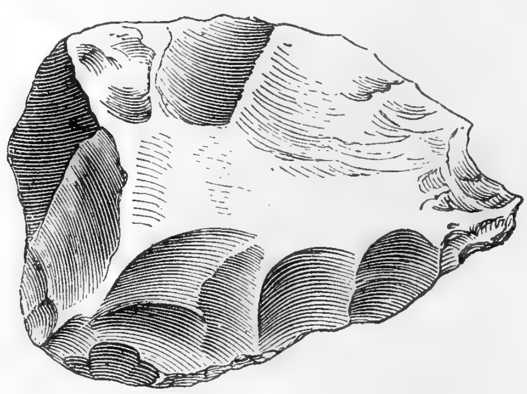

Fig. 52. Flint Implement from Langey, Fr.; $\frac{2}{3}$ nat. size.

teeth are only just sprouting and pushing their way beneath the deciduous ones. Most of the teeth of the mammoths found in caves are those of young animals, and when we come to look closely at all the bones and teeth, we are at once struck with the fresh-looking conditions of the majority, and are convinced that they can have had no long journey to perform between the death and burial of their owners. Another thing which we may observe in the case of bones found in caves is that many of them are seen to be scored and gnawed into their present shape by the teeth of some animal, and analogy has led to the conclusion that the great devourer of the bulk of the animals whose remains are found in caves was the hyæna. This savage beast in those early days, as now, was in the habit of dragging its victims wholesale or piecemeal into its den, where it devoured not the flesh only, but also the bones, rejecting only the very hardest portions; and the teeth, then, left lying about on the floor, would soon be covered up by the mud brought in, partly by the frequenters of the caves, partly by floods, and also by the slow deposits from the moisture which found its way through cracks and fissures. It seems a strange thing that such animals as those spoken of should ever have been found side by side in our country,—the northern rein-deer and the southern hyæna, for instance. Some geologists have not been able to realize that they could thus have lived during the same season, and

have suggested that during those early times there may have been warm and cold periods, each lasting perhaps ten or twelve thousand years, and that "the southern animals lived in our island during the warm periods of the glacial epoch, while the northern animals lived during the cold periods." That there were such interglacial periods of warmth appears to be not improbable, but, allowing this, I do not see how we can, with the testimony of cave deposits before us, fail to be convinced that northern and southern forms did not make their appearance separately, each living here for awhile and then disappearing, but that they lived during long periods actually side by side. The condition of the various bones found is such that they undoubtedly convey the impression of perfect contemporaneity; any way, they are found lying side by side, without a vestige of rolling or wear and tear, in deposits from a few inches to only a foot or two in thickness; a rein-deer bone, for instance, almost, if not quite, in contact with the jaw of a hyæna, and bearing upon it what we can hardly help believing to be the marks of the hyæna's teeth upon its surface. The remains of Arctic and southern forms are so intimately blended together, and present such similarity of aspect in such caves, for instance, as those of Creswell, and the gnawed bones of rein-deer, rhinoceroses, and other animals are so exactly like the bones gnawed by hyænas of to-day, that the evidence appears overwhelming that they all must have lived side by side; and the easiest way of accounting for such a condition of things is to suppose, as has been suggested, a seasonal immigration and intermingling of the animals in a climate subject to an extreme range of summer and winter temperature, unless we accept as an alternative that the intermingling may have taken place at the commencement or close of an interglacial period, but that there was such an intermingling of forms appears to be beyond question.

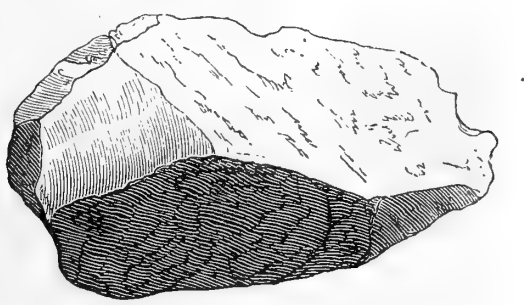

Fig. 53, Quartzite Implement, Creswell; $\frac{3}{4}$ nat. size.

Now, when these animals lived in England, man was their companion; there is now not the slightest doubt of that. The evidence, fifty years ago so scanty, so incredulously received, has become overwhelming. To take the evidence of caves alone: in numerous caves in this country, in those of France, Belgium, and Switzerland, traces of man's presence have been found in vast quantity intimately mixed up in the same beds in which the bones of the animals are found, and showing most clearly that they must have been deposited at the same time. And is it asked, what are those traces? Have you any human bones? The answer is, not many. A few have been found in some caverns, and these have been found to be in exactly the same condition as those of the extinct animals; but I do not think that we have any right to expect to find *many* bones, and one reason is that although man was then present, his numbers were few indeed, compared with the vast multitude of wild animals. Why, even as recently as the time of Queen Elizabeth I believe that the population of all England did not exceed that of London to-day. Man would then be in the proportion of one to many thousands of wild animals, with whom he would have to wage a hard and often precarious struggle for existence. And again, if the men of those primitive times neglected their dead, as do some tribes of men now, the hyænas, wolves, and other animals would not leave many bones to tell the story of man's existence. What we *do* find to prove that man then lived are his weapons and his tools,—rude, indeed, at first, and ill formed, but yet showing a certain amount of design and intention in their shape never to be found in mere naturally-broken stones. Man's first tools and weapons were the pebbles picked up around him, rudely fashioned for such simple work as he required them to perform by a few pieces chipped off here and there, to enable them to be more readily held in the hand, or fastened into holders of bone or wood; such rude tools would serve as hammers to break bones for the sake of their marrow, to scrape the skins of animals killed in the chase with the primitive stone-headed lance or arrow. Implements of this primitive character have been found in abundance in the lower beds of some of the caves of this and other countries, as well as in the ancient river-beds. In England, the caves of Creswell and that of Kent's Hole have furnished many highly characteristic specimens of these earliest efforts of human skill, whilst the gravels of the Thames Valley, of the Ouse and other rivers in this country, and those of Amiens and Abbeville, amongst others in France, have also furnished numerous examples, some made of quartzite and other pebbles, others of flint. In the case of the rude hammer-stones, little has been

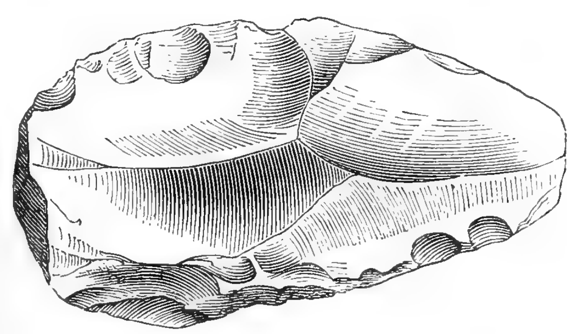

Fig. 54. Flint Implement, Le Moustier, Fr.; $\frac{3}{4}$ nat. size.

done to the original pebble beyond giving it a sufficiently convenient form to enable the user to grasp it, but the bruised and battered face of the implement clearly shows to what use it was put. In the scrapers we see that a sharp edge has been placed by skilful blows on one side of the stone, whilst the other has been probably fastened into some kind of holder. Primitive man would very soon have discovered that few of the stones commonly met with more readily adapted themselves to his wants than the flints so common wherever there was chalk, or, indeed, often found scattered here and there in gravel-beds and other spots at some distance from their original source. The sharp edge of a broken flint, the comparative ease with which it could be variously shaped, soon led man to prefer it to other materials.

The razor-like edge of a flint-flake would be found to make an excellent knife, and such long thin flakes are amongst the implements most commonly met with. They are usually flat on one side, with a well-defined bulb of percussion at one end,—a proof of their having been struck by a deliberate blow from the original block; a mere splinter broken accidentally by the crushing of a mass of flint never has this well-marked protuberance. The upper surface of these flakes has also two or more faces, giving to the specimen in section a more or less triangular aspect. Broader flakes, with a sharpened edge at one end, would adapt themselves as scrapers. We also often find flints with very carefully-worked points, which may well have been used for boring holes in fragments of bone, to form needles, and they might be used, too, for piercing the skins, that the bone needle might more readily pass through. Some of the most primitive implements were large, somewhat oval-shaped, ones, made of flint or some other hard stone; these, which are frequently found in the old river gravels, and some of which are made of quartzite pebbles, have been discovered in the earliest beds of the Creswell caves in England would, if bound firmly into a handle, serve as formidable axes or tomahawks, and were probably used as such.

(*To be continued.*)

THE REAPPEARANCE OF AN OLD FRIEND.*

BRITISH natural history has produced few works which have become national classics. But White's "Natural History of Selborne" undoubtedly takes rank as such, and finds its place on our library shelves side by side with Goldsmith and Addison. The unaffected and graceful simplicity of the style, the cheerful and yet reverential tone of thought, the quiet love for all that lives, the keen power of observation, and the readiness to draw correct inferences from complex facts, have rendered this work the most popular of its kind that was ever written. There is a freshness and a charm about every page, which seems imbued with the breath of the green fields, and the spirit of the silent woods. One returns to its occasional perusal with delight. It appeals as successfully to youth as to age, and commands its large circle of readers by reason of its broad sympathies. Naturalists and non-naturalists alike confess to its charm. Perhaps no other English work on natural history could have borne half the editing which White's "Selborne" has had to experience. We have editions of all kinds, voluminous and compendious, *éditions de luxe*, and "cheap editions for the people"; and still the work has lived throughout.

In our opinion the present edition of White's celebrated book is the best which could possibly be produced. There are many reasons why this should be the case. First of all the editor, Professor Bell, is himself one of our best naturalists and natural-history writers. No man more fully recognizes the scope of his work—no living naturalist has more pleasant memories of by-gone workers. Moreover, Professor Bell has lived in White's house at Selborne for the past thirty years, and so must have become imbued in no small degree with the spirit and charm of the place. This edition of White's work has, therefore, been edited in the house where it was originally written. The style in which this edition has been published demands a few words of remark. The binding of both volumes is after the modest style which White would have undoubtedly preferred. The engravings and woodcuts (not numerous) are of the best kind of artistic work; the paper is excellent; the type large and cheerful; and there is an absence of those abounding foot-notes in small print on every page, which, in some editions of White's "Selborne," have made its perusal almost a torture.

After saying thus much for the manner in which this edition has been brought out, we have next to draw attention to several matters in which it differs from all previous editions. A few years ago a series of twenty letters, constituting a correspondence between Gilbert White to Robert Marsham, of Stratton, Norfolk, were discovered, and published, we believe, in the "Transactions of the Norfolk and Norwich Naturalists' Society," accompanied by a notice of Mr. Marsham's life, by Mr. Thomas Southwell, hon. sec. These letters are included in the second volume of the present edition. In addition to them are other letters and correspondence of Gilbert White's, which now appear in print for the first time. Such is the correspondence between himself and his brother John, who was English chaplain at Gibraltar, and afterwards vicar of Blackburn, in Lancashire. In these letters we gain a loveable knowledge of Gilbert White otherwise than as a naturalist. His brother seems to have been as simple-minded and guileless as himself, and this correspondence has a quaint, affec-

* "The Natural History and Antiquities of Selborne." By the late Rev. Gilbert White. Edited by Thomas Bell, F.R.S., F.L.S., and Professor of Zoology, King's College, London. 2 vols. London: John Van Voorst.

tionate, brotherly, but unfortunately old-world charm about it that almost makes one sad. The Rev. John White was a correspondent of Linnæus, six of whose letters also appear in these pages. Another correspondence consists of a series of letters, also now first published, between White and his brother-in-law, Mr. Thomas Barker, of Lyndon Hall, Rutland, and the latter gentleman's son. Natural history and archæology are the chief subjects herein pleasantly discussed. The correspondence between the well-known naturalist Pennant and Gilbert White form the bulk of the first portion of the work. In addition to the above new additions to White's "Selborne," rendering it richer and fuller than any previous edition, Professor Bell has had the sympathetic aid of several modern naturalists, among whom the suggestions of Professor Alfred Newton on that part of the work relating to Birds, have unquestionably raised its authoritative value. All lovers of natural history and English classics who can afford it, will have this best edition of White on their library shelves; and all our provincial scientific societies and clubs ought to include it in their circulating list.

THE HARVESTMAN "SPIDER."

THE animal which from the enormous length of its legs has attracted the notice of most persons from childhood upwards, seems from its very slight resemblance in external appearance to the form of a spider to have received a name to which it is not at all entitled; some of the peculiarities of spiders are so exceptional to the general characteristics of all other living beings, that no creature in which they are absent ought to be called a spider. I am therefore induced to compare the harvestman with an ordinary spider, in the hope that some one will suggest its appropriate name.

The first difference that strikes the most superficial observer is, that the bodies of spiders are divided into two distinct portions by a very slender waist which connects the abdomen with the chest and head; in the harvestman the head, chest, and abdomen are all under one shell or horny covering, without any waist or division. The most remarkable feature in spiders is the position and character of the reproductive organs. In the female spiders they are on that portion of the abdomen next the waist, and in the male spiders in a much more extraordinary position, being connected with the head of the animal by the palpi; a further exception to the prevailing order of nature, and equally remarkable, is seen in the fact that each male spider has two distinct and complete organs, one in each palpus, and both exactly alike, one not being the complement, but the exact counterpart of the other. In the different species of spiders these organs vary in a greater or less degree, so that by these differences species might be determined; some of them are extremely complex and beautiful, as in *Lyniphia marginata*, others, though more simple, are still worth studying. May not the absence of this remarkable apparatus in the harvestman be considered a conclusive answer in the negative to the question, Is it a spider?

Those who have not the opportunity of examining these organs microscopically I would refer to Blackwall's celebrated treatise on spiders, where they will be found beautifully illustrated. This authority says, spiders moult or change their skin from five to nine times, according to species; that the male sexual organs are not commenced in their development till the penultimate moult, and are not completed till the final moulting: now in the harvestman the sexual organs are found in the smallest individuals. In the harvestman there is one slight approach to the resemblance of spiders, the position of the reproductive organs being similar to that in the female spider, viz., nearly close to the chest; in the harvestman the position is the same in both sexes, there is, however, no difficulty in distinguishing one sex from the other; in both sexes the organ is situated within a flexible tube by means of which it is drawn within the abdomen, or projected externally, both organs are represented in the following sketches (figs. 55 and 58).

In the male organ the parallel lines represent the membraneous tube, the shaded portion the horny instrument which slides within it by introversion, or something like the tube of a telescope; it may be seen in its normal position (after the body has been rendered transparent) seated within the abdomen with the hooked point near the external orifice, this hook is attached to the shaft by a movable joint, and the hairlike termination of the hook is also jointed, so that it is possible to place the hook in a line with the shaft, though it is always found at a right angle as represented; the length of the organ with its elastic tube extended is about as long as the diameter of the body, the horny portion being a little shorter than the membranous. The female organ, from the great length of its elastic tube, which is about twice as long as the body of the animal, is probably used as an ovipositor, the horny portion is not more than one third the length of the elastic tube; the latter, however, when drawn within the body is shortened by contraction to the length of the horny part then contained within it. This part appears to be formed of a series of bands or rings connected together and terminating in lobes, to which are attached strong tufts of hair, or spines, the bands are covered with stout hairs about as long as the width of each band, and the membranous tube is so thickly studded with minute hairs, that when contracted within the body the organ appears black, the surface resembling that of a steel rasp. It might be supposed that a tube that has to slide within itself by introversion would be greatly impeded by the friction arising from its surfaces being prickly instead of smooth. If we ask

what purpose do these hairs serve, or why is it that all other internal organs being so perfectly adapted by their smooth and lubricated surfaces for moving together without friction, these should present a roughened surface, we might learn a lesson of humility by reflecting that as we proceed step by step in our investigations of the mysteries of nature, we are continually finding how inadequate is the capacity of the human mind to comprehend the designs of an omniscient Creator. I now proceed to the consideration of the breathing organs. Spiders breathe by branchia, organs somewhat resembling the gills of fishes, being a series of thin membranous plates placed together like the leaves of a book in two clusters within the abdomen, one on either side the sexual orifice in the female. The air is admitted to these branchia through stigmata, or horny plates having fine irregular openings, presenting the appearance of a grating, corresponding in some measure to the spiracles of insects. The harvestmen breathe by trachea, the same as insects; there are two spiracles, one on either side of the abdomen; the principal tracheal tube proceeds a short distance from each spiracle, and then divides and subdivides, permeating every part of the body. The eyes present a difference in number only to those of spiders; Blackwall says, "the number of the ocelli in spiders is always two, six, or eight;" in the harvestman the number is four. The same authority in describing the legs of spiders says, "the foot (or portion corresponding to the tarsus of insects), is divided into two parts, the tarsus and metatarsus, and in some species into three joints." The tarsus of the harvestman has in some cases as many as ninety joints, the lowest number I have met with being twenty-five. The feet of spiders are terminated by two or more claws, generally pectinated; those of the harvestman have only one claw, curved, but quite smooth. The palpi of the harvestman closely resemble those of the female spider, excepting that the claw at their termination is generally, if not always, pectinated in the spider and smooth in the harvestman, though I have found two instances in which the claws of the palpi were pectinated, although those of the feet of the same individuals were not so. The absence of spinnerets distinguishes the harvestman from the generality of spiders, but as some few species of spiders are also without them, this is not a difference of so positive a character as the other points I have noticed. The last organs to which I would draw attention are the *falces*: in spiders these are terminated by a curved claw sometimes deeply serrated on its inner side; in the harvestman the termination is a pair of forceps or nippers like those of a lobster or crab. These *falces* in most of the harvestmen are rather smaller than we find them in spiders, but in some cases they are fully three times larger than we find them in any of the spiders, and assuming quite a different form; in fact, they no longer resemble reaphooks, from which they derive their name of *falces*, but are much more like pickaxes: therefore, following the same kind of nomenclature, I propose *bipenni* as an appropriate name for them; the fig. 57 shows an outline of their peculiar form and the comparative size that the *bipenni* and the *falces* bear to each other. All the specimens I have found possessing *bipenni* were males; I think, however, these organs do not distinguish the sexes, but a difference of species, as both males and females are found bearing the *falces;* as the upper spur or arm of the *bipenni* is not present in those individuals that are less than half grown, I think it is not fully developed till the last moult, as in some that are about three-quarters grown it is very short

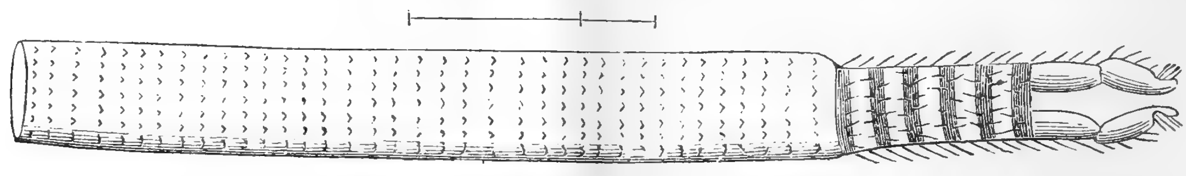

Fig. 55. Oviposito of Harvestman "Spider." (The lines show actual size of full-grown organs.)

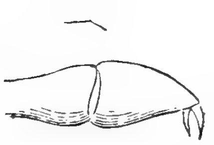

Fig. 56. Falx of Ditto.

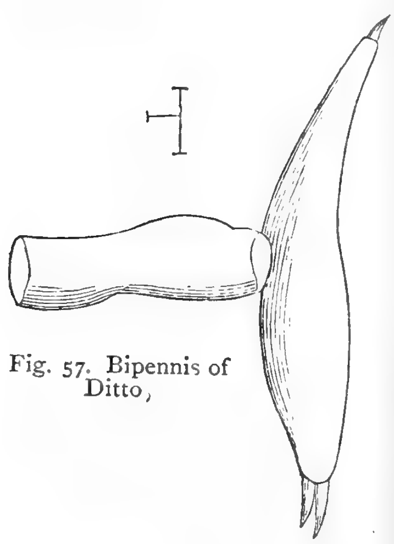

Fig. 57. Bipennis of Ditto,

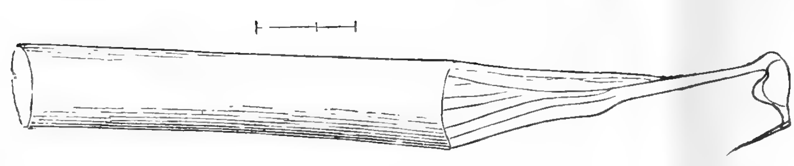

Fig. 58. Intromittent Organ of Ditto.

Fig. 59. Part of *a* (Fig. 55) highly magnified.

and round at the top, instead of terminating in a sharp point, as when the animal is full grown.

Having now shown (as I think conclusively) that the harvestman is not a spider, will some one tell me what it is?

Norwich. J. H. CARY.

THE MIGHTY DEEP.

IN a general way persons have a better appreciation of the vastness of the land than of that of the sea; mainly because the former is more frequently forced on their attention. The area of the ocean is nearly thrice that of the land; the one being estimated at about 52 million square miles, and the other at 145 million square miles. On the land, as well as in the ocean, there are vast tracts on which life is absent or scanty; but whereas, on the land the inhabitable portion is to a great extent superficial, in the ocean life occurs more or less abundantly at all depths. The ocean forms one continuous mass of water broken up into irregularly-shaped portions by the land. When portions of the sea are inclosed by the land, the water undergoes so marked a change in character that such inclosed portions (forming lakes and lagoons) can no longer be considered as forming part of the ocean. The great bulk of the sea is concentrated in the South hemisphere, and the pole of the sea (that is, the centre of the hemisphere in which it is most extensive) is in 52° S. 6° E. In this hemisphere the land is to sea as 1 to 8, while in the opposite hemisphere there is nearly as much land as sea.

The mean depth of the sea has been variously estimated, but as yet there are scarcely sufficient data for accurate estimates. Buffon suggested it might be 200 fathoms or 1,200 feet; Lacaille, 163 to 273 fathoms; Laplace, 656 fathoms; Lyell, 2,600 fathoms; and Herschel, 3,520 fathoms. The most probable mean is about 2,600 fathoms. Assuming this as correct, the average volume per square mile would be 418,176 million cubic feet, and the total volume 60,635,520,000,000 million cubic feet. The mean height of the land is 1,000 feet above the sea-level, which would give a volume of 1,449,676,800,000 million cubic feet for the supramarine portion. Hence the ocean's bulk is 41 times greater than that of the land above its upper surface.

One of the causes now in operation which tend to make the ocean encroach upon the land is the introduction of detrital matter into the sea. Every grain displaces its own bulk of water, and so far causes it to encroach upon the land. Denudation is always going on at a probable mean rate of one foot in 3,600 years, at which rate all the land would be removed in about ten million years. The sea, in that case, would gain on the land at the mean rate of about five square miles per year. If all the land were transferred to the sea, the mean depth of the latter would be reduced to 1,500 or 1,600 fathoms. Other causes, however, may influence the extent of the ocean. One is the subsidence of land below the sea-level and elevation or subsidence of the sea bottom. The subsidence of the whole of the land would involve a depression of about 30,000 feet; and the elevation of the whole of the sea bottom would require an uplift of about 35,000 feet. In all probability elevation and subsidence proceed simultaneously in different parts of the earth, and may or may not counterbalance each other. The bearing of this conjecture is that extensive subsidence or elevation of the sea bottom is calculated to be more influential than the introduction of sediment in causing the sea to advance upon or withdraw back from the land. The introduction of a mass of matter equal in bulk to all the supramarine land would be sufficient to cause the ocean to overflow the land up to about the level of 6,000 feet above the present level; while alterations of level less than those of which the geologist is cognizant, as local phenomena at least, would, if extended over large areas account for the displacement of entire continents and oceanic basins.

It has been assumed that the bulk of the ocean has been approximately unaltered; but surmises might be made upon the variations in the amount of water which, in its aëriform and liquid states, is temporarily withdrawn from the sea. A rough calculation indicates that the average amount of vapour constantly in the air corresponds to about 13,412,704 million cubic feet of water, and that the amount of fluid required to keep all lakes, rivers, &c., supplied for six months is about 2,364,072,004 million cubic feet, or about sufficient to form 5,894 square miles of sea of average depth. The entire absence of all flowing fresh waters, or a doubling of their present volume (extreme conditions which are not likely to have happened), would have no appreciable influence geologically in altering the relative areas of land and sea. The accumulation of snow and ice would perhaps be more influential. For, supposing it possible that at one time there were no ice, and that at another some 10 million square miles were covered therewith to a depth of 500 feet, this would give a volume of 139,392,002,000 million cubic feet, which corresponds to 309,071 square miles of sea of average depth. If we assume that the sea has retained its mean depth unaltered, the utmost probable irregularity in the amount of rainfall and in the accumulation of ice upon the land would not cause its area to vary by so much as one million square miles. Hence, from a geological point of view, the possible influence of such irregularities may be disregarded. There is yet another influence to be noticed. It is exceedingly probable—nay, we may say certain—that the sea bed consists of material which is in places permeable, and in others impermeable, to sea water. At what rate the water percolates into the rocks, and what

quantities are retained in them temporarily, we are not prepared to state; but it does not seem likely that the rates of absorption and evaporation have varied much. A certain portion of the water, however, remains in the rocks for prolonged geological periods, and it is believed the amount is constantly increasing. It is not known what the amount may be, but there seems to be no reason to suppose that it has affected the volume of the ocean to any large extent. The conclusion at which we arrive is that at every geological period there has probably been water somewhere on the earth's surface, having a mean depth of over 9,000 feet. It has been suggested that comets' tails may have condensed on the earth, and, as a consequence, given rise to floods; but such speculations may be dismissed as purely imaginative. The attractive influence of the land draws the ocean above the level it would otherwise have, and thus causes the water to encroach upon the land; but such elevation of the water is a local phenomenon only, the mean level of the ocean being in no way affected.

The existence and, to a large extent, the conditions of the present sea are indicated by direct evidence; but the position, depth, and conditions of the seas of former periods can only be ascertained by indirect means; and mainly from the fossil remains found in strata. The occurrence of a species belonging to a group of organisms which, so far as known, is exclusively marine, is a fair proof of the co-existence of marine conditions, provided, of course, such remains have not been introduced by accident or by derivation from older marine beds. In most cases collateral evidence sufficiently indicates whether the stratum is or is not marine. The distribution of marine organisms is dependent upon circumstances, so that a study of these in the case of living species enables us to infer, more or less correctly, some of the conditions of the sea in which they lived; and amongst others that of the contour or depth. The matter is, however, somewhat complicated, for it would seem that depth alone has little influence on the distribution of animals and plants, and that the influencing conditions are temperature, light, food, currents, &c. The evidence then which fossils afford as to depth is probably wholly circumstantial. In the present seas the greater depths are associated with a low temperature, slow currents or movements of water, sediments of extreme fineness, and absence of solar luminous rays; the probabilities are that such has always been the case in the older oceans; but the only constant condition associated with great depth is absence of the sun's light. In closed seas the temperature may be high at great depths, and under certain conditions moderate currents may exist in the deepest oceans. In a general way shallow waters are associated with the stronger currents, the coarser deposits, varied conditions of temperature and accessibility to solar light. Deposits of extreme fineness may occur in shallow and cold seas, which conditions would be nearly the same as those of the deepest seas; for, irrespective of depth, the principal difference is presence of light in the shallow water. This would allow of the existence of species to which ordinary light is directly or indirectly essential, along with such of the deep-sea forms as could live in association with them. In the shallowest waters along the sea margin we find a certain relation between the depth and particular groups of species of organisms; but examination shows that this relation holds because certain conditions of temperature, exposure to air, food, &c., concur with such depths. These conditions may correspond with a certain depth in one area and with a different depth in another area; so that it becomes necessary to take many circumstances into account before drawing conclusions as to depth from the association of certain species. When the conditions regulating the co-existence of particular species are known, we can readily infer somewhat as to the depth of the water. These considerations have an important bearing upon the geographical distribution of species and the inferences deducible from such distribution in space and in time, and, consequently, upon the continuity of oceans in space and in time, or, rather, on the continuity of certain oceanic conditions. A. RAMSAY.

(*To be continued.*)

BOTANICAL WORK FOR APRIL.

THE early part of the present month will be the season to work at several species: thus, the common Pilewort (*Ranunculus Ficaria*, L.) is now in full bloom in some parts of Britain. We have been recently taught to regard it as comprehending two distinct species; for example, it is divided into two varieties, viz., a. *divergens*, F. Sch.; b. *incumbens*, F. Sch. The first variety, *a*, has lobes of lowest leaves *not overlapping at the base*, lowest sheaths narrow: variety b, *incumbens*, has lobes of lowest leaves *overlapping at the base*, or parallel with petiole and lowest sheaths, very broad, amplexicaul.

Which of these varieties occurs in your district? It will make many a walk pleasant and delightful to know one is helping to clear up a question not yet satisfactorily answered.

In the south of Europe another form is found; in fact, a distinct species, named by most botanists *Ranunculus Ficariæformis*. Have we not overlooked it in England? It is very similar to our plant, and may quite possibly have been passed over. Let it be cleared up this spring.

Viola sylvatica, Fries.—This is another species which can be worked up in April. Most of our readers are aware that from the days of Linnæus until a very few years ago, this plant passed current under the old name of *V. canina;* nay, not a few still persist in knowing it under the old name, and refuse to listen to the "*new species.*" Linnæus's name

(*canina*) was applied by him to the present and another species, *V. canina* of Babington's "Manual." When it was found needful to separate the two, this name was restricted by Fries to the one now recognized as the true *canina*, and he proposed *sylvatica* as the present species. Most European botanists at once adopted his views, but it was some time before we recognized the new species. But we wish to call the attention of our readers to another fact, which may be advantageously worked at in every district, for *V. sylvatica* comprehends two well-marked varieties, viz., a. *Riviniana*, b. *Reichenbachiana*. We have many book species, with not near the distinctive characters possessed by the above. *V. Riviniana*, Rich., has the leaves broadly cordate, acute; calycine appendages persistent, broad; petals *blue*, remarkably broad, lower one with *many branched veins at its base;* spur *thick, cream-coloured*, or very *light blue*. *V. Reichenbachiana*, Bor., leaves cordata, prolonged; calycine appendages *small, narrow;* petals *bright lilac*, lower one with *parallel*, few, *nearly simple veins at its base*; spur *flattened*, light lilac. If the above varieties are once recognized, they will never again be mistaken. The common form, that often called *V. canina*, Linn., is seen as a roadside plant on every sunny bank or sandy lane in the northern counties, but *V. Reichenbachiana* is generally found, and then very sparingly, in deep, damp ravines and glens, where the sun seldom penetrates, although sometimes seen on the same bank with the common form. It may be identified at a glance, the peculiar lilac petals exceedingly narrow when compared with any other species; also the narrow, often sharp-pointed spur, just tinted with pale lilac: the leaves are, when young, pale green, not thick, fleshy, and dark green, like *Riviniana*, and it is altogether the prettiest violet known in the British islands.

Draba verna, L.—Continental authors make six species out of our earliest spring gem, the "Whitlow Grass" (*Draba verna*). We have often wondered how many of these could be found on our old walls or sandy pastures. After fifteen years' experience in the northern counties and Wales chiefly, we can only detect three varieties, for we do not think they can fairly take rank as species. From Boreau, "*Flore du Centre de la France*," we take the following; so that our friends, who may have the opportunity, may work them out:—1. *Erophila* (*Draba*) *brachycarpa*, Jord. Leaves oval, lanceolate, narrowed at both extremities, entire, clothed with simple and bifurcate hairs; flower-stalks slender; sepals oval, hispid; petals oboval, oblong; pedicels flexuose, 2–4 times longer than the silicules; silicule very obtuse at summit; seeds elliptical, few in number. Loc. old walls and rocks; "*the first to flower.*" 2. *E. glabrescens*, Jord. Leaves dark-green, lanceolate, narrow, gradually tapering into a long petiole, often smooth; sepals oval, a little hairy; petals oboval, oblong, with slightly spreading lobes; pedicels hardly three times as long as the silicules; silicules nearly evenly oblong, elliptical; style very short; seeds 20–24 in each hemicarp. Loc. dry open places. 3. *E. medioxima*, Jord. Characters same as in *E. glabrescens*, only the pedicels are longer, 4–5 times the length of the silicule. 4. *E. hirtella*, Jord. Leaves linear lanceolate, pointed, narrowed into a broad petiole, often furnished on each side with one or two very sharp teeth, covered on both sides with long, spreading, often bifurcate hairs; flower-stalks flexuose, hispid at their base; sepals oval oblong, a little unequal at the base, clothed above with long recurved hairs; petals oblong; seeds oval, brown, covered with minute points, 30–35 in each cell. Loc. sandy places. 5. *E. stenocarpa*, Jord. Leaves linear, pointed, narrowed into a footstalk of nearly their own width, covered with numerous bifurcate hairs; flower-stalks flexuose, numerous, in crowded tufts; sepals oblong, hispid; petals oblong; seeds oval, pale brown, a little rough, about 40 in each cell. Loc. dry open places. 6. *E. majuscula*, Jord. Leaves ashy-green, oblong oboval, a little pointed, wedge-shaped at the base, with a petiole slightly narrower than their own breadth, entire, or more usually bordered with strong teeth, clothed with short, thickly-set bi- or tri-furcate hairs; flower-stalks often hispid in their lower half; sepals rounded oval, slightly hispid near the summit; petals large, nearly three times size of calyx, oboval, veined, with wide obtuse lobes; seeds oval, pale brown, finely covered with raised tubercles, 40 in each cell. Loc. dry sandy pastures. They are thus divided dichotomously:—1. Lobes of petals, more or less apart, spreading, 3; lobes of petals nearly contiguous, 2.—2. Silicules rounded, very obtuse at the top, 1; silicules oblong, much narrowed below, 4.—3. Leaves linear or lanceolate, narrow, 4; leaves oblong oboval, 6.—4. Sepals oval silicules oblong, elliptical, 5; sepals oblong; silicules linear oblong, 5.—5. Pedicels hardly three times the length of silicule, 2; pedicels 4–5 times as long as the silicule, 3. We have met with No. 1, *D. brachycarpa*, Jord., frequently in sheltered nooks; also *D. glabrescens*, Jord.: the latter comes into flower a week or two later, and is what we have recognized as our "*common*" plant. Then occasionally we have come across what we should most unmistakably name *E. majuscula*, Jord.: however, as it is an open question, we hope it may soon be settled, as to whether we have two, or three, or even six varieties amongst us.

F.

GLOW-WORMS.—Returning from Barnstaple on Friday evening, the 22nd of February, I was surprised to observe a glow-worm shining as brilliantly as in summer. To be certain I was not deceived, I caught and brought it safely home in a vesta box. Is it not very rare to see them at this time of the year?—*Arthur Smyth, Parracombe, North Devon.*

THE SEALS AND WHALES OF THE BRITISH SEAS.

By Thomas Southwell, F.Z.S.

No. IX.

The Pilot Whale (*Globicephalus melas*, Trail), known in Shetland as the Ca'ing or Driving Whale, is a frequent, although a very uncertain, visitor in British waters. It is met with, according to Lilljeborg, in the North Sea and northern part of the Atlantic Ocean, occasionally as far north as Greenland; off the Orkney and Shetland Islands it frequently makes its appearance, and has been found on the British coast as far south as Cornwall. In following. Bell gives many instances of large numbers of these animals being taken, the last of which, quoted from the "Zoologist" for 1846, is, perhaps, the most extraordinary. It is there stated, "on newspaper authority," that 2,080 were taken in Faroe in the previous year within six weeks, and that 1,540 were killed *within two hours* in Quendall Bay, Shetland, on the 22nd September, 1845. This species (fig. 61) is remarkable for its peculiarly rounded head,—hence its generic name; the flippers are long and pointed, the dorsal fin long and low; the teeth about an inch in length, seldom all present in the adults, and the normal number, according to Bell, about twenty-four on either side each jaw; ten to twelve is, however, the more usual number present.

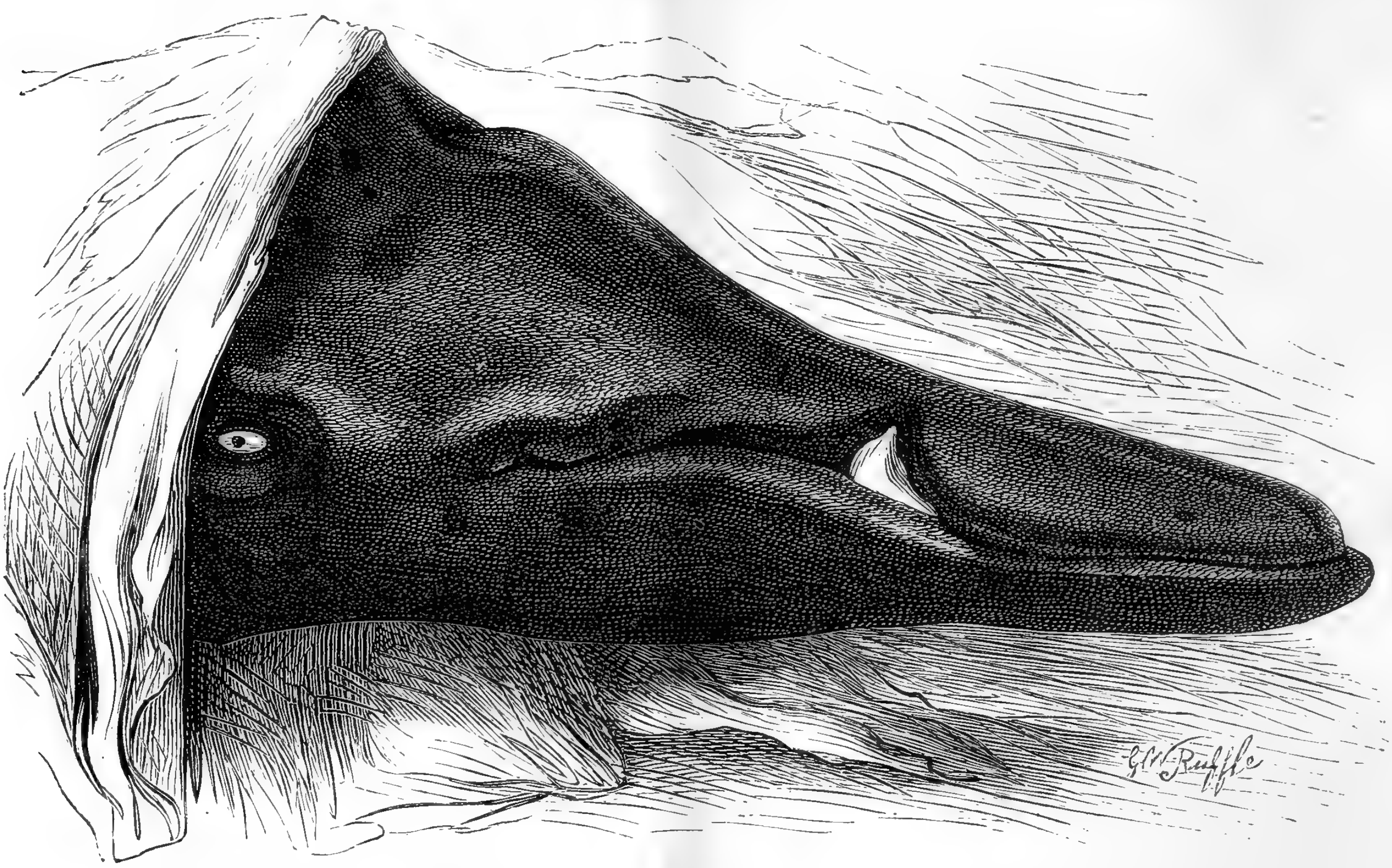

Fig. 60. Head of *Ziphius* or *Mesoplodon* (mentioned in Dr. Busteed's and Mr. Southwell's papers of last month; from Trans. Roy. Irish Acad., vol. xxiv.).

Bell's "British Quadrupeds" it is said that it also appears to enter the Mediterranean. This species is pre-eminently gregarious, and generally occurs in large herds, often numbering several hundreds. So strong is their habit of association that they follow the leading whale like a flock of sheep, a habit of which the Orkney and Shetland Islanders are fully aware, and avail themselves to the full. When a herd appears in one of the bays, boats immediately set off, and, if possible, get to seaward of them, then gradually approaching, with shouts and splashes, they urge the whole herd shoreward, and are generally successful in driving a large portion of the whales into shallow water; but should the leader break through the line of boats, the probability is that no efforts the boat's crews can make will prevent all its companions The length of the adult is about nineteen or twenty feet, its colour glossy black, with the exception of a white stripe along the belly, which has a heart-shaped termination under the throat. Its favourite food is said to be cuttlefish. The figure is from the "Transactions of the Zoological Society," vol. viii., pl. 30.

The Common Porpoise (*Phocæna communis*, F. Cuv.) is the best known of the Cetacea inhabiting the North Sea, being met with in abundance all round the British Isles, seldom occurring far from land, and often ascending large rivers for a considerable distance: it has been seen in the Thames as high as London Bridge, and in the harbour at Lynn I have often seen it. Nothing can be more interesting than to watch a shoal of these animals at sea, sometimes tumbling and gambling under the bows of the vessel

which is passing rapidly through the water, with as much ease as if she were motionless, or chasing each other playfully round and round the ship as she lies becalmed, their white bellies glistening in the clear sea, and frequently, apparently out of pure mad delight, leaping completely out of the water, returning to their native element with a most determined header. But it was not till I saw these animals in the Brighton Aquarium that I fully appreciated the beauty, and I may even say the poetry, of their motion; swimming along in a series of gentle curves,

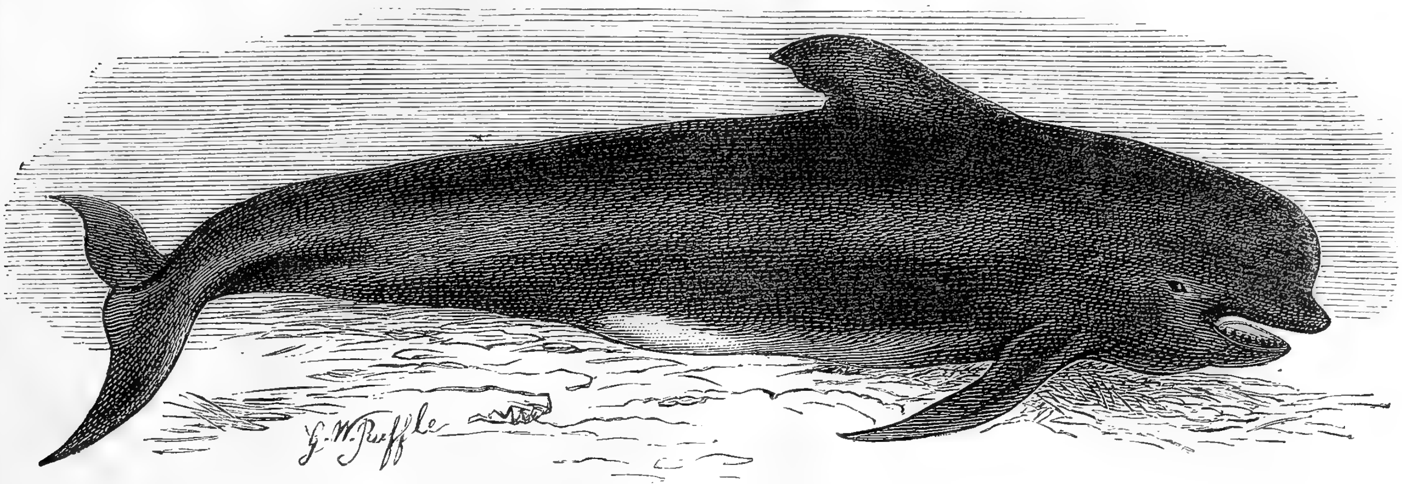

Fig. 61. The Pilot Whale (*Globicephalus melas*).

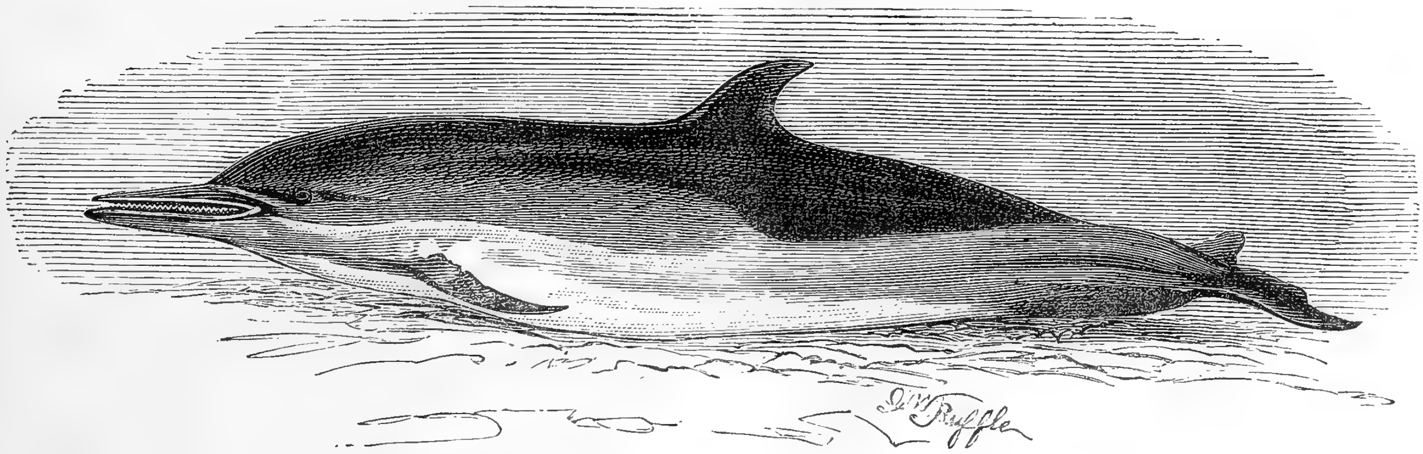

Fig. 62. Common Dolphin (*Delphinus delphis*).

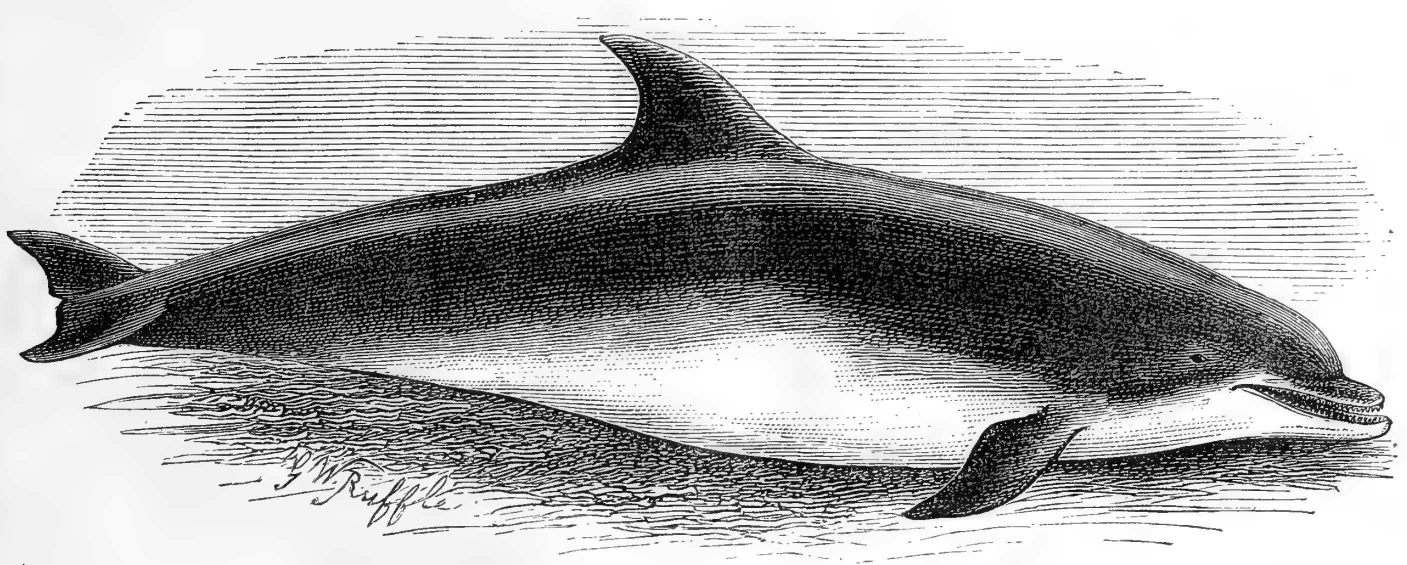

Fig. 63. Bottle-nosed Dolphin (*Delphinus tursio*).

they just bring the blow-hole to the surface, breathe without stopping, and continue the curve, till in due course they reach the surface again. This is repeated for the whole length of their spacious tank, or is varied by unexpected eccentricities, all indescribably graceful. Under these favourable circumstances for observation it is also clearly seen that the horizontal tail is the propeller which gives the motion; the alternate upward and downward pressure of this organ against the water evidently producing the graceful mode of progression which is so difficult

to describe, but so easily understood when witnessed. All this I understood in theory before, but it was a new and beautiful sight to view the practice from a stand-point, on a level with the animal itself, and as it were in its own element.

The food of the Porpoise consists of fish, and it follows the shoals of herrings, &c., amongst which it commits great depredations; it has a taste for salmon. and is sometimes taken in the salmon-nets. The period of gestation is said to be six months, and it brings forth one young one at a birth; its colour is black on the back, shaded off to silver-grey on the belly, the whole skin beautifully smooth and polished. The teeth number about twenty-five on each side of either jaw, and are spatulate, with a contracted neck, unlike the usually conical teeth of the *Delphinidæ*. The length is four or five feet. The flesh of the Porpoise seems formerly to have been esteemed as an article of food, and is mentioned several times in the L'Estrange Household Book (1519 to 1578) and other similar records; it is said by one who has eaten it to be "excellent meat, dark in colour, and large in fibre, but of excellent flavour, very tender, and full of gravy."

The COMMON DOLPHIN (*Delphinus delphis*, Linn.), fig. 62, is not unfrequently met with in the seas surrounding the British Isles, but it doubtless often passes unrecognized. It may, however, be at once distinguished from the Porpoise by its attenuated beak, the head of the Porpoise being obtuse, and the beak altogether absent. It is a native of the temperate seas, and becomes scarcer as the north is approached. Lilljeborg says it is seldom obtained on the coasts of Scandinavia; in Greenland it is rarely met with. Professor Bell, in his "British Quadrupeds," says: "The mythological and poetical associations which belong to the Dolphin, its reputed attachment to mankind, its benevolent aid in cases of shipwreck, its dedication to the gods, and many other attributes expressive of the high estimation in which it was held in olden times, afford a striking example of how the unrestrained imagination of the ancients could raise the most gorgeous structures of poetry and religion upon the most slender basis . . . it requires some stretch of the imagination to identify the round-headed creature which is represented in ancient coins and statues, with the straight sharped-beaked animal" which is here figured. It is said to destroy at one fell swoop all the romance which once surrounded this species; but Dr. Gray tells us that "the dying Dolphin's changing hues" are not observed in a cetacean at all, but in a fish of the genus *Coryphæna*, which, although normally black, is stated by Mr. Couch (as quoted by Mr. Yarrell) to have changed to a fine blue whilst he was making a drawing of it. The food of the Dolphin consists of fish, cuttlefish, and crustaceans, and on the Cornish coast it makes its appearance in considerable numbers, according to Mr. Couch, in the month of September during the pilchard season. It is very social in its habits, and even more sportive in the water than its relative, the Porpoise. The upper surface is black, shaded off to white below, the length about six to eight feet. The illustration s copied from Reinhardt's figure.

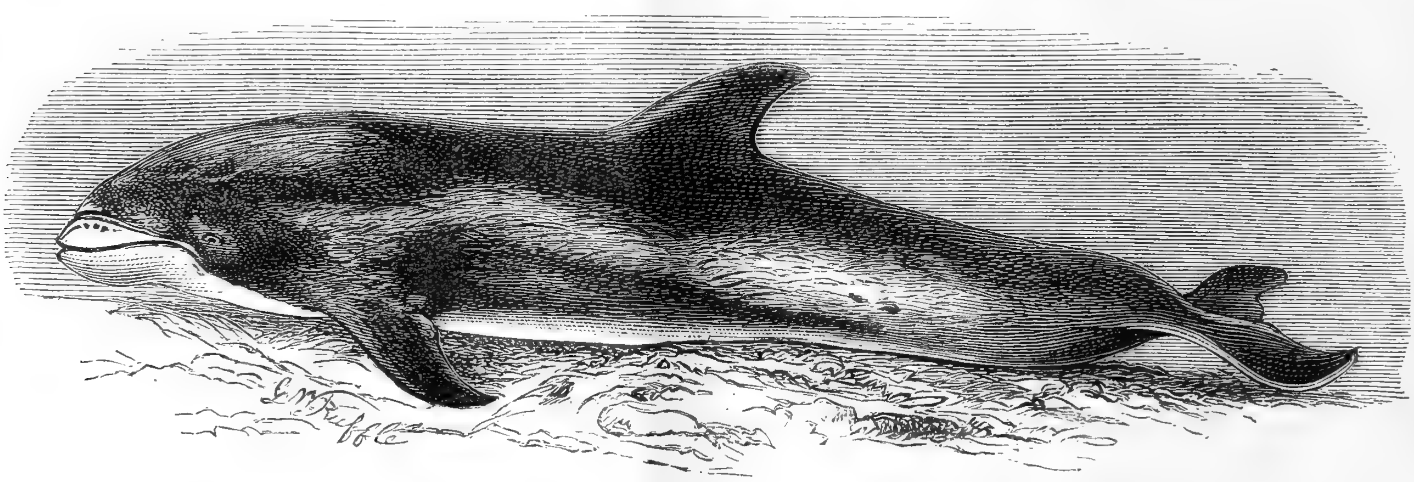

Fig. 64. White-beaked Dolphin (*Delphinus albirostris*).

The BOTTLE-NOSED DOLPHIN (*D. tursio*, Fab.), fig. 63, appears to be found occasionally from the Mediterranean to the North Sea; it is by no means, however, a common species.

Of the habits of this species very little is known: its colour is black above, shaded to dirty white below, and its length from 8 to 12 feet. The figure is from a drawing of a nearly adult male taken at Holyhead, in October, 1868, for which I am indebted to the kindness of Prof. Flower.

The WHITE-SIDED DOLPHIN (*D. acutus*, J. E. Gray) is a rare species, which has occurred in a few instances on the British coast: its colour is black above and white below, between which runs a broad band of yellowish brown, about the centre of which, and surrounded by it, is a large oblong patch of pure white. A figure and description taken from one of a herd of twenty landed at Kirkwall, on the 21st August, 1858, will be found in the "Ann. and Mag. of

Nat. Hist." (3rd series) for August, 1864, vol. xiv. p. 133.

The last species on the British list, the WHITE-BEAKED DOLPHIN (*D. albirostris*, J. E. Gray), fig. 64, is also of rare occurrence: it is a native of the North Atlantic, but little is known of its habits. A dolphin of this species was killed at Hartlepool in 1834, but not recognized at the time: the skull is now in the Cambridge Museum. It was, I believe, first described as British by Mr. Brightwell, under the name of *D. tursio*, from a specimen taken off Yarmouth in 1846. His paper, with a figure from a drawing made by Miss Brightwell, will be found in the "Ann. and Mag. of Nat. Hist.," first series, January, 1846, vol. xvii. p. 21. Another specimen was shot by Mr. H. M. Upcher, near Cromer, and will be found recorded by Dr. Gray in the same Magazine, for April, 1866, vol. xvii. p. 312. A fourth was taken at the mouth of the Dee, in December, 1862; and a fifth on the south coast in 1871. A few Continental specimens are also recorded.

In September, 1875, a young female was taken off Grimsby, and in March, 1876, a young male was captured off Lowestoft. The first-named of these latter formed the subject of a communication to the Zoological Society of London, by Dr. Cunningham, of Edinburgh, and the latter of a subsequent notice Mr. J. W. Clark, of Cambridge. Both papers will be found printed in the "Proceedings of the Zoological Society" for 1876, p. 679, *et seq.*, and figures of the two specimens are given on the same plate. Through the kindness of Mr. Clark I am enabled to give a figure of the Lowestoft specimen (fig. 64). Mr. Clark's figure differs considerably from Dr. Cunningham's both in outline and in the disposal of colour, being much more slender, and showing considerably less white; both, however, differ still more from Mr. Brightwell's figure than they do from each other. Mr. Clark's specimen was glossy black on the upper part, and creamy white on the under; the upper lip white, with a black spot at the tip, and a few irregular pale grey cloudings on its surface; the coloration exceedingly beautiful, and such as no drawing could give an adequate idea of. Mr. Brightwell's specimen had the whole upper part and sides rich purple-black, the lips, throat, and belly cream-colour, varied by chalky white. This specimen, an adult, measured 8 ft. 2 in. in length, Mr. Clark's 5 ft. 5½ in., and Dr. Cunningham's 4 ft. 2 in. The teeth vary in number, but are about twenty-six on either side each jaw.

This species concludes the short list of the twenty-two British Cetacea, of which I have endeavoured to give a popular, but I hope at the same time, so far as it is at present known, a reliable account, my principal object, as I stated in my introductory remarks, being to induce those residing in suitable localities to take up the study of this interesting family, and to assist in the identification of those specimens which from time to time are cast upon our shores.

MICROSCOPY.

THE AMERICAN MICROSCOPICAL JOURNAL.—We have just received parts 1 and 2 of vol. iii. of the *American Journal of Microscopy and Popular Science*, and we have much pleasure in calling attention to this unpretending periodical. It is not like our own quarterly *Journal of Microscopical Science*, intended for specialists only, but addresses itself to all who are anxious to know what is being done in those branches of natural history requiring the aid of the microscope. This periodical started into existence in 1876, the annual subscription being 50 cents.: with the commencement of the present year that has been increased to 1 dollar, and the work enlarged from 16 pp. to 24 pp. Amongst its contributors are Professor H. Smith, of Hobart College, N. Y. (the celebrated diatomist), Professor Hitchcok, J. Edwards Smith, Zeus Zundlach, and others. A subscription of 5s., which may be sent in English stamps, entitles the subscriber to a copy every month, post-free. Mr. Charles Stodder, 131, Devonshire Street, Boston, has consented to receive subscriptions.

MACHINE FOR MOUNTING.—I send you a sketch of a little mounting machine, which I have found very useful. A is a zinc vessel to hold hot water;

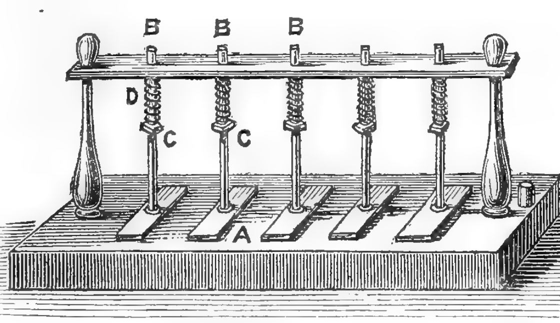

Fig. 65. Machine for Mounting Slides.

B are brass rods, topped with screws; C are nuts; and D are brass springs. By turning up or down the nuts C, any degree of pressure can be obtained upon the thin glass.—*Albert Smith.*

A NEW POSTING-BOX FOR SLIDES.—A new style of posting, or as our American brethren call it, "mailing" box contrived by Dr. R. H. Ward, has proved successful beyond anything tried before. An account of it is therefore published in the hope that it may be made more generally useful. In the boxes hitherto used for posting slides, the slides are occasionally found shattered to pieces, while the box containing them is quite uninjured or only a little strained. In some boxes containing six or twelve slides, half or more of the slides have been found broken in a perfectly sound box. This seemed to indicate not the effect of a crushing blow but the result of the inertia of the slide itself, which was only supported by the wooden racks at the ends and more or less perfectly by the cotton stuffed around it. An

adequate occasion for such an accident might be furnished by throwing the mail-bag from a waggon to the pavement, or transferring it to or from a rapidly-moving train. It was therefore decided to reject the wooden rack altogether, and instead to support the slide by the whole of its edges and much of its sides by cloth, leather, indiarubber, or other soft and evenly-yielding material. This may be attained with the common boxes by removing the racks, lining the top, bottom, and ends with thick, soft cloth, and arranging folds of the cloth, glued or stitched in place, like a rack at each end of the box so that a double thickness of the cloth shall extend between the slides from each end one inch towards the centre. It is better, however, to have the boxes made for this use somewhat larger than the customary size, so that very thick beaver cloth can be used for the packing. For six slides a box may be made of hard wood 3-16ths of an inch thick, $3\frac{3}{8}$ inches long, $1\frac{1}{4}$ wide and $1\frac{1}{4}$ deep inside measurement. The folds of cloth should be so arranged that not more than an inch in the centre of the slide is unsupported, except when large cover-glasses are to be used, when more space should be left to avoid pressing on the cover. The outside of the box is covered with strong thin cloth. The comparative safety of this method is indicated by the experience of the American Postal Club. During a trial of several months in many of the circuits, not one slide is known to have been broken while packed in this manner, while to slides in the ordinary boxes with wooden racks, accidents are unfortunately frequent. For sending by express, these boxes should be made of thicker wood, or enclosed in larger cases, to prevent crushing by the weight of heavy packages among which they may be carried.

ACTINOCYCLUS BARKLYI.—I believe this form has not been published, at least in a scientific sense. Some dozen or more years ago a diatomaceous deposit was discovered in or near the Yarra Yarra, Melbourne, Australia, and was distributed under the name of the "Yarra deposit." The form about which "C. V. S." inquires received the MS. name of *Coscinodiscus Barklyi*, in honour, I believe, of one of the governors. It was originally referred to the *Coscinodisci* from the supposed absence of the marginal nodule. It is, however, to be detected by careful examination, although very minute; it is situated on the extreme edge of the disc, and when the inner surface of the valve is uppermost, it is often invisible. *Coscinodiscus fuscus*, Norman, is supposed to be identical with the above species.—*F. Kitton.*

SAP CRYSTALS.—The sap of the Scotch fir contains very beautiful crystals; they may be obtained at this season of the year by cutting a slice through the bark, from the under side of the branch; in a few days the sap will flow containing the crystals.—*S. C. Hincks.*

CLEANING DIATOMACEÆ.—I have followed "Davis" in his manner of cleaning diatoms, but cannot get rid of the flocculent matter and the sand,—in fact, my slides are sand interspersed with diatoms, &c. I have washed, and washed, and washed, till there is very little left out of a rich gathering; can you give me any help?—*H. G. W.*

THE RESOLUTION OF DIATOM TESTS.—At a recent meeting of the Royal Microscopical Society, Mr. Adolf Schulze, of Glasgow, read a paper on "A new and simple Method of Resolving the finest Balsam-mounted Diatom Tests." The author described the success which had attended the examination of this class of objects by means of the reflex illuminator, and the immersion paraboloid moistened with *Castor oil* instead of water. The lines on *Amphipleura pellucida* were in this manner shown in order to illustrate Mr. Schulze's method.

ZOOLOGY.

THE GOLDEN ORIOLE (*Oriolus galbula*).—Can any of your readers supply information respecting the *notes* of this bird? It is asserted by those who have heard it in Austria, that it has three definite notes, and that those notes follow each other in the following musical order:

If this can be verified, it will elucidate a remarkable statement made by Nieremberg in his *Naturæ Historia*, 1635, in which he speaks of a bird called the *Tritono Ave*, and to which the late Canon Kingsley refers in his Life (vol. ii. p. 332). It is worthy of remark that Bechstein states that the male bird's notes resemble "a flourish of trumpets," and very curiously the above notes are a common bugle-call. It will also be noticed that the last two notes are those of the Cuckoo. If there be any truth in the statement advanced, a very singular musical question is solved, that a bird possesses the power of uttering a "common chord"! This was observed by Shield in his treatise on Harmony (1800), and which first attracted the attention of the writer of this notice.—*W. H. C.*

PARASITIC WORMS IN LEG OF GREBE.—When skinning a Little Grebe (*Podiceps minor*, Pen.), on November 25th, 1874, I came upon a cluster of nematoid worms amongst the muscles and tendons of both legs—exactly in the same place in each—near the lower part of the tibia. From their larger size they appeared to have been longer in the left leg than in the right. They were rather hard and stiff—not soft and flabby—of a *regular* spiral form, of about six turns, tapering to each end, the largest about three-quarters of an inch in length—not following the turns of the spiral: if straight, they would be about an inch long. They seemed unable to straighten

themselves; when found, they were twined together like the strands of a rope, and I observed that one, after being separated from the others, bent *slowly* round until it was twisted on itself. The bird was very much emaciated, and no wonder, as, in addition to the worms in the legs, it had a large fibrous tumour in the back." The above extract is from some "zoological notes" contributed by me to the "Proc." of the Berwickshire Naturalists' Club, vol. viii. p. 288. Lately—February 27th, 1878—I had a similar case, but in a different species of bird,—an immature female of the Water-hen (*Gallinula chloropus*). When skinning the legs near where the muscles end and the tendons begin, there was a quantity of gelatinous matter which, as the bird was apparently healthy and in good condition—not like the Grebe in that respect,—induced me to examine it carefully, when I found in both legs a number of the same worms, or a nearly allied species, to that found in the Grebe. The chief difference was in their not being so *regularly* spiral, various sizes intermixed, and not in such compact clusters. Although some of them were entwined and interlaced together, others, when the lower part of the tibia was pressed from below upwards, came out singly amongst the tendons, with a spiral motion like that of a corkscrew. Perhaps some of the readers of SCIENCE-GOSSIP may, from the above imperfect description, be able to identify the species to which they belong.—*Andrew Brotherston, Kelso.*

THE SOLITAIRE.—Prof. Newton recently drew the attention of the Zoological Society to the statement of Leguat that every Solitaire (*Pezophaps solitaria*) carried a stone in its gizzard, and exhibited one of three stones found by Mr. Caldwell associated with the remains of as many birds of that species in the caves of Rodriguez.

THE NATIONAL ENTOMOLOGICAL EXHIBITION at the Westminster Aquarium well deserves a visit from every entomologist who has the opportunity. The committee who have arranged it are well known entomologists, and it is not too much to say that there never was a series of collections of insects like this got together before. The insect fauna of Great Britain and other countries are shown; insects beneficial and injurious to man; insect productions useful in commerce, &c. Nearly all the collections are sent by persons living in and near the Metropolis. The few exceptions to this rule are Mr. Prest, of the York Natural History Society; Sir Thomas Moncreiffe, who sends a fine collection of Scotch insects; and Lord Walsingham, of Merton Hall, Thetford, whose collection of preserved larvæ, with their food-plants, is one of the most interesting and beautiful objects in the exhibition: the specimens were all prepared by his lordship's own hands, and they represent a great amount of labour and study. Nearly every class in the exhibition is well represented; the Lepidoptera naturally predominating on account of their greater beauty. The collections of Mr. Wellman, Mr. Stevens, and Mr. Farn are especially good, while among the micro-lepidoptera, Mr. Machin's and Dr. Harper's collections are remarkably good: one case of the latter gentleman's contains upwards of 3,000 specimens. Coleoptera and Hymenoptera are also well represented, the latter by Mr. F. Smith, of the British Museum, whose collection is the result of forty years' labour. The life histories of insects, illustrated by Messrs. Adams, of Enfield, the cases showing the habits of insects, prepared by Messrs. Eedle & Son, and the foreign lepidoptera of Messrs. Cook & Son are highly meritorious.

THE ODONTOPHORE IN MOLLUSCA.—At a recent meeting of the Zoological Society, Mr. P. Geddes read a memoir on the mechanism of the odontophore in certain mollusca. In this paper the view of Cuvier—that the movements of the radula depend upon those of the underlying cartilages—was substantially revived, arguments being adduced against the more recent theory of Professor Huxley, that it runs like a chain-saw, the cartilages merely forming a pulley-block. The use of bacteria as food by *Lymnæus* was also described by the author in this paper.

"THE FINS OF ELASMOBRANCHS, WITH CONSIDERATIONS ON THE NATURE AND HOMOLOGIES OF VERTEBRATE LIMBS."—This is the title of a paper by Prof. Mivart, read before the Zoological Society, wherein the author detailed his dissections of the fins of Elasmobranchs, which dissections had convinced him that the paired and azygous fins are of similar nature. He represented them all to have resulted from the centripetal growth and evalescence of a primitively distinct series of cartilaginous rays developed in longitudinal folds, of which one was dorsal, one ventral, and two were lateral. He also advocated the view that the limb-girdles result from the further centripetal growth of the evalescing limb-cartilages, which growth seeks a *point d'appui*, the pectoral limb-girdles in fishes shooting upwards and downwards as well as inwards to obtain a firm support, and at the same time to avoid the visceral cavity. He contended that the Archipterygium was not to be sought for in *Ceratodus*, which he by no means regarded as a primitive type of structure, but rather in *Raia* and especially in the ventrals of *Polyodon*. He objected to Gegenbauer's view that the metapterygium formed the limb-axis of the cheiropterygium, advocating instead the propterygium, or, if not that, then the mesopterygium. He cited the varying conditions described as evidences of the presence of an innate intra-organic polar force as the main agent in morphological modifications.

THE IMPORTATION OF HUMBLE BEES INTO NEW ZEALAND.—There would probably be no great

difficulty in taking out dormant fertile female humble bees to New Zealand, if they were dug up in the early spring, and packed in moss, and put into an ice-chest and kept cool until their arrival at their destination. If, however, the common species, *Bombus terrestris*, were sent out, it might do a great deal of harm, and very little good. It obtains the nectar from the red clover and other flowers with narrow corolla-tubes, or otherwise difficult of access, by boring holes from the outside, as has been shown by Darwin. The red-tailed humble bee, *Bombus lapidarius*, on the contrary, always, so far as my experience serves, goes to the natural opening of the flowers, and is the great agent in fertilizing the narrow-tubed ones. I once watched a small patch of red clover for upwards of an hour. Both of the above species came to it; *Bombus terrestris*, without exception, buried its head amongst the flowers, and made holes at their base, or sucked the nectar from those already made. *Bombus lapidarius* just as invariably went to the opening of the flowers, although the most of them had holes made by the other species. *Bombus lapidarius* has a longer proboscis than *B. terrestris*, and this is probably the reason for the different way in which they go to work. Early in the summer I have seen young individuals of *B. terrestris* sucking the nectar from the flowers of the scarlet runners in a legitimate manner, but they soon learn to make by preference the holes at the base. The successive steps in their education may be watched from their first hesitation, awkward attempts to do this to the instinctive-like facility they attain later on in the season. I know nothing more interesting to a naturalist when he wishes to rest from more serious study than to devote a few hours on a summer's day to watching the humble bees at work amongst the flowers. They have been favourites of mine from early childhood, one of my first experiments being the determination of the stinging powers of the three species, and the time they might be kept between the hollow of the two hands before they got sufficiently angry to sting. My recollection is that *Bombus lapidarius*, although it has the longest proboscis, has also the shortest temper and most virulent venom, and if it be not set free as soon as its first angry note is heard, it will not fail to punish severely. Notwithstanding this trait in its character, I have no hesitation in recommending that it is the one that should be sent out to New Zealand, and that *Bombus terrestris* should not be.—*Thomas Belt, the Cedars, Ealing.*

Development of Frogs' Spawn.—For the last two years I have carefully watched the development of frogs' spawn, and my observations give much quicker results than those noted by Mr. McAldowie. In 1876 frogs spawned on April 4th, and my note of April 8th says, "Observed tadpoles associated together in twos and threes, gills visible with Coddington lens." Thus in four days my tadpoles were as far advanced as those of your correspondent in twelve. In 1877 frogs spawned in the afternoon of March 30th; at 9 a.m. on the 5th April one tadpole was free, and at 5 p.m. several were clear of the albumen. If possible I will again collect and watch the spawn this year. If others do the same, and we all send our notes to the editor of Science-Gossip, perhaps he may make some use of them. While examining tadpoles under the microscope in 1876, I fancied that the whole of the exterior cuticle was covered with very minute vibratile cilia. I could find no mention of such a fact in any work, and concluded I must have been mistaken; last year, however, rather confirmed my idea, and as many readers of this journal will doubtless keep and examine tadpoles this year, may I ask them whether my suspicion is correct or not.—*R. B. C., Fanhams Hall, Ware.*

The Human Eye.—A well-written and attractively got-up book on this subject has just been published by Messrs. Hardwicke & Bogue, from the pen of Dr. R. E. Dudgeon. It deals with the optical construction of the human eye, and has some novel views concerning subaqueous vision, air lenses, &c. The optics of human vision are clearly and scientifically discussed, and yet with a popular and even attractive style of description. The book is well illustrated.

Practical Taxidermy.—We have been frequently applied to to recommend a good book on Taxidermy, and are now glad to be able to do so. Mr. Montague Brown has just completed a work entitled "Practical Taxidermy: a Manual of Instruction to the Amateur, &c." It is the completest little hand-book of the subject we have, giving figures of tools, modes of stuffing and setting up birds and animals of all kinds, preparing skins, &c. It is published at the *Bazaar* office, 32, Wellington-street.

The Freedom of Modern Science.—Mr. John Murray, of Albemarle-street, has issued, in a cheap and well-got-up form, the address on this subject by Dr. Rudolf Virchow, given before the Conference of German Naturalists at Munich last September. The high authority of the speaker and the fact that he has not often expressed his opinions on the evolution theory, although he may be said to be the founder of embryological research, gave his remarks much prominence. The address is a searching criticism into the views of Darwin, Haeckel, Naegeli, and others, and a protest against modern science being led captive by any theory, no matter how fascinating.

New Species of British Insects.—In the last number of the *Entomologists' Monthly Magazine* Mr. P. Cameron describes two new species of *Nematus* under the names of *N. hibernicus* and *N. placidus.*

The former was taken near Dublin, and the latter in England.

THE BARBASTELLE (*Synotus Barbastellus*).—This evening (March 7th), whilst driving near Colchester, I fancied I saw three bats that were new to me. I struck at one with my whip and killed it. On picking up my game, I was pleased to find the above bat was my unknown friend. This district therefore can be added to those in which this rare British mammal occurs.—*Henry Laver, F.L.S.*

BOTANY.

CAREX PUNCTATA, GAUD.—This species was sent to the Botanical Exchange Club, labelled as follows:—"Ledges of perpendicular rocks in the Waterwinch, Tenby.—*C. Bailey.*" This exceedingly rare sedge has hitherto been reported from several places in Ireland, the Channel Islands, and Cornwall: we believe the above locality is new to science. It is very closely allied to *Carex fulva*, Good., but differs from that species by its *smooth humid fruit*, which is obscurely veined, but not ribbed. The fruit is also pale green, but in *C. distans*, L., it is yellowish-brown. The beak is slightly longer than in our herbarium specimens, but the rough nut, tumid punctate fruit, and tall slender stem, at once distinguish this from its near allies.

VEGETABLE TERATOLOGY.—I recently found a singular monstrosity in Harleston Firs, *Anagallis arvensis*, which had the petals transformed into leaves, and the calyx also leaf-like. The plant was fertile. On the Barnack quarries *Trifolium procumbens*, was so called *viviparous*.—*G. C. Druce.*

THE "RAIN TREE."—At a recent meeting of the Linnean Society, Professor Thistleton Dyer described the "Rain Tree" of Mogobamba, South America, under the name of *Pithecolobium saman*. The so-called "rain" is the fluid excreta of cicadas which feed on the juices of the foliage, and its dropping is therefore analogous to the "honey-dew" which sometimes drops from the leaves of lime-trees by the agency of aphides.

POLYGALA CALCAREA.—In the February number of Trimen's *Journal of Botany*, Mr. James Britten notes the occurrence of a specimen of *Polygala calcarea* in a collection of British plants presented to the British Museum herbarium. It is associated on the same sheet as *Polygala vulgaris*, and was collected at Hughenden, Bucks, in June, 1865. It had not previously been recorded as occurring in that county.

MONSTROSITY IN R. BULBOSUS.—In a field near Leicester, in June, 1877, I found a specimen of *Ranunculus bulbosus*, having three completely developed whorls of petals, and nearly fifty stamens. Neither myself nor any of my botanical friends have ever found similar specimens. If the petals were developed from the stamens, the original number of the latter must have been much greater than usual.—*Arthur Wheatley.*

VOLVOX GLOBATOR.—In the neighbourhood of Ashton-under-Lyne *Volvox globator* has been found, by myself and others, in great abundance, from the 24th of last November (on which date it was first detected in our locality) up to March. The pits have been visited two or three times each month since November, and several times we have got volvox from under the ice. I myself gathered it from under half an inch of ice on January 28th, some of which were exhibited at the meeting of the Manchester Field Naturalists' Society on February 3rd.—*Thomas Whitelegg.*

GEOLOGY.

THE INFLUENCE OF THE ADVENT OF A HIGHER FORM OF LIFE IN MODIFYING THE STRUCTURE OF AN OLDER AND LOWER FORM.—This was the title of an important paper, by Professor Owen, C.B., F.R.S., recently read before the Geological Society. The author, after referring to the general question of the modification of the structure of organic forms produced by the action of external influences, indicated that, in connexion with this, changes in the nature of the prey of carnivorous animals ought to be taken into consideration. He inferred that cold-blooded aquatic animals formed a much greater proportion of the food of Mesozoic than than of Neozoic Crocodiles, and pointed out as connected therewith the well-marked distinction between the amphicœlian and procœlian type of vertebræ respectively characteristic of the two groups. The procœlian character of the trunk-vertebræ better adapts that part of the body to be sustained and moved in air, and may be connected with the incoming in Tertiary times of mammalian prey inducing the Crocodiles to rush on shore. The Mesozoic Crocodiles were encased in a much stronger and more complete dermal armour than their successors, doubtless for their protection from the great Ichthyosaurs, Pliosaurs, &c., which coexisted with them; but as these passed away at the close of the Secondary epoch, the armour of the procœlian Crocodiles has become more scanty, and the diminution of weight and rigidity thus caused would favour progression in the air, and the rapidity of movement required for capturing mammalian prey on land. The difference in the position of the palato-nares, and in other related gular and palatal structures, between the Mesozoic and Neozoic Crocodiles is apparently connected with the power possessed by the latter of holding submerged a powerful mammal without permitting the

access of water to the posterior nostrils and windpipe of the Crocodile: and hence the author is inclined to ascribe a fish-diet even to those massive-jawed Crocodiles from the Purbeck (such as *Goniopholis crassidens* and *simus*), which in some respects might seem fitted to grapple with large and active mammals. The small size of the upper temporal apertures in Tertiary and existing Crocodiles is regarded by the author as a further proof in the same direction; these apertures are reduced by the progressive increase of the osseous roof of the temporal vacuities, which again is correlated with increase in the bulk and power of the temporal muscles, the main agents in biting and holding. The differences in the length and strength of the jaw, as a rule, testify in the same direction. Further, the fore limbs in Mesozoic Crocodiles are shorter than in Neozoic species, indicating that the former were more strictly aquatic in their habits; the fore-limbs in all Crocodiles being closely applied to the body during rapid swimming, and small limbs being less obstructive than larger ones. On the other hand, they would be less efficient as a means of progression on land, and hence it may be inferred that the advent in Tertiary times of mammals frequenting the water-side, tempting the Crocodiles to make a rush upon the land to seize such passing prey, would lead to such strenuous action of the fore-limbs as would account for the increased size and power of those organs in the Neozoic species. The author concluded with some remarks upon the influence of the above considerations upon our views as to the generic divisions of Crocodiles.

THE GLACIAL PERIOD. — Dr. Ricketts, F.G.S., has reprinted his valuable paper, read before the Liverpool Geological Society, on the "The Conditions existing during the Glacial Period." It also contains an account of the Glacial deposits in the valley between Tranmere and Oxton, near Birkenhead.

MARINE FOSSILS IN THE GANNISTER BEDS.—Prof. G. A. Lebour has announced the discovery of marine fossils in the lower coal measures, or "gannister" beds of Northumberland, between Stocksfield station and Whittonstall. Hitherto no marine fossils have been met with in these rocks.

THE GEOLOGY OF COLORADO. — The Atlas of Colorado, soon to be issued by the United States Geological Survey of the Territories, under Prof. F. V. Hayden, embodies the results of the geological and geographical work of the survey during the years from 1873 to 1876 inclusive. This Atlas will contain the following maps:—1st, A general drainage map of Colorado, on a scale of twelve miles to the inch. 2nd, An economic map of the same region, having at its basis the above-mentioned drainage map. This map will indicate the areas of arable, pasture, timber, coal, mineral, and desert land in as great detail as possible on the scale. 3rd, A general geological map on which the areas covered by the principal formations will be shown. The drainage map will form the basis for this also. 4th, A map showing the scheme of the primary triangulation in the State. Scale, twelve miles to the inch. 5th, Six topographical sheets, showing the same area as that covered by the general drainage map, but in much more detail. The scale of these sheets is four miles to an inch. The relief of the country is indicated by contour lines, at vertical intervals of 200 feet. The area covered by each of these sheets is 11,500 square miles. 6th, Six geological sheets, of which the basis is the six topographical sheets just mentioned. On these the detailed geology is expressed by colours. With the appearance of this map, Colorado will be better known, topographically and geologically, than any other State.

WINDS, OCEAN-CURRENTS, AND TIDES.—Mr. W. L. Leighton, F.R.G.S., has published a second edition of his lecture on the above subject, together with the discussion which arose when the discourse was delivered. Mr. Leighton is a formidable antagonist, and is not likely to surrender his own views because some scientific authorities think lightly of them. Even the latter must confess that he makes out a good case.

FOSSIL FUNGUS.—Prof. Lesquereux has recently described a fossil fungus (*Rhizomorphus sigillariæ*) discovered under the bark of a *Sigillaria* from the Carmelton Coal of Beaver County, Pennsylvania.

NOTES AND QUERIES.

A SINGULAR PLACE FOR A BIRD'S-NEST.—Whilst waiting on the platform of the railway-station at Coventry, one day last week, I observed an old sparrow's nest *built inside a signal-bell.* This bell is of a saucer shape, some 10 inches in diameter, and placed with its concave face within about $1\frac{1}{2}$ inch of the side of the "crossover" bridge, and directly over the centre of the railway. The hammer-head of this bell is attached to a long lever, in connection with a wire, leading to a distant operating spot. There is also a heavy counterweight and lever, forming part of the apparatus of the signal; so that when the bell is struck, there is, besides the loud ringing, a great rattle and noise of levers, and a heavy thump caused by the falling counterweight. This bell is used many times every hour of the day, and frequently during the night, three or four blows being struck each time. The officials of the station informed me that inside the bell was a favourite building place of the sparrows, and that the nests had frequently to be removed, but that young ones had been hatched and reared there.—*G. A. Biddell, Ipswich.*

CARNIVOROUS SLUG.—Whilst perusing the columns of your journal, the accounts of the predatory slug recalled to my memory a circumstance which occurred to me some years ago. While out walking

one day in the country, across my path I observed a slug and a butterfly very close together. On stooping down I noticed that the half of the body of the butterfly had disappeared, and the slug (the common white variety) was busily devouring the remainder. In a short time it all disappeared. Now, the curious part of this is, how could the butterfly have been so unwary as to allow the slug to approach so near? Perhaps some of your numerous correspondents could relate some similar circumstances.—*J. D. O., Carrickfergus.*

ASPLENIUM SEPTENTRIONALE.—In the January number of SCIENCE-GOSSIP there is a paragraph which states that *Asplenium septentrionale* was discovered near Dolgelly, by Mrs. Chamberlain Barlow, of Edgbaston, in 1867. Allow me to inform the writer that it had been previously discovered in the district by the Rev. T. Salway, vicar of Oswestry, and in a "List of certain Plants found in the Neighbourhood of Barmouth," published by him in 1863, this passage occurs: "*Asplenium septentrionale*, a single plant gathered by me on the wall of the turnpike-road between Hendwet and Dolgelly, in 1842," and this note, "I could never find this in subsequent years, though I gathered only a few fronds, and left the root."—*F. C. Rawlings, Barmouth.*

VENOMOUS REPTILES OF IRELAND.—In reply to S. E. Bennett, page 42, for February, I beg to say we have none such; our reptiles are frogs, green lizard, one newt, and Natter Jack, in Co. Kerry. It was not St. Kevin, but a bigger saint—St. Patrick—who sent them adrift from Croagh Patrick, in Co. Mayo. "He gave the snakes and toads a twist, and banished all the vermin," as the song goes.—*F. H.*

SOLANUM DULCAMARA.—In reply to Mr. W. West, Bradford, as to above, I regret to say I have known two fatal cases in this neighbourhood (Athy) from children eating the berries of this plant. One fact is worth one hundred doctors.—*F. H.*

THE MILDNESS OF THE SEASON.—On the 21st of February, whilst taking my accustomed walk through the beautiful beech-woods of Nettlebed, I was surprised by an adder attempting to cross my path, and having destroyed many of these venomous reptiles, particularly in the county of Devonshire, I found, on killing it, that it was the largest I had ever seen,—its length being not less than twenty-eight inches. The occurrence of this reptile so early, with the primrose and other wild flowers in bloom, on this elevated, picturesque, healthy range of the Chiltern Hills, is a proof of the extreme mildness of the season.—*Thomas Shipway.*

SMALL MITES.—Some newly-married friends of ours, gone to reside in a farmhouse in a pretty, undulating country district in Gloucestershire, have been sadly annoyed for some time past by the presence of numbers of very small mites; they come on their books, clothes, and furniture,—even on the piano specks of dust-like particles are often seen, and an inexperienced eye would think them to be only dust; but, on close inspection, they are seen to move. Benzoline and sanitas have been tried in vain. Can any of your readers throw any light on the matter?—whence they come, or in what way they may be exterminated?—*M. R. D.*

AGE OF SEA-GULLS.—It may not be generally known to what age sea-gulls live. There is a gull living at Freshwater, Isle of Wight, at the present time, which has reached its thirtieth year, and is apparently as well as ever. It was taken when young from the nest, and was supposed to be a male bird, but when nearly twenty years old, to the surprise of every one an egg appeared, and since that time it has laid many more. All this time it was called by the name of Willie, but the name was then changed to Rittie, which it still bears. The bird is perfectly tame, and comes at once when called. It lives in a garden, and is fed principally on meat and fish; it has also a great liking for cheese. The bird has been in the possession of the same person all its life; I believe it is the common gull (*Larus canus*).—*Frank Morey.*

MIDNIGHT SONGSTERS.—On Feb. 15th and three following evenings, blackbirds, thrushes, and many of the smaller birds have been singing merrily at midnight. The gentleman at whose house I am staying, a doctor, driving late through the park, and several others, have heard the above, but no one seems ever to have known of such an occurrence before. A blackbird was seen while singing, perched on a tree, close to the house-windows. The nightingale has not yet been heard in this part.—*M. B. Gordon, Little Chart, Kent.*

BIRDS SINGING AT MIDNIGHT.—On the night of Saturday, the 15th of February, I was returning home from the house of a friend, between the hours of eleven and twelve o'clock, when I was considerably surprised to hear a thrush singing away merrily. Presently, the songster was joined by others, and in a short time a regular concert began, taken part in by at least a dozen thrushes and blackbirds, whilst the robin, wren, and other small birds were singing and chirruping in the hedgerows, just as you hear them in the early morning in summer. On arriving home, I called the attention of my friends to this singular circumstance, and we stood at the door for some time listening with wonder to this—at such an hour—unusual melody. On the following night, about the same hour, the concert again commenced, and was even more lively than on the preceding night, and continued until morning. On both nights the weather was very calm and mild, and the moon shone with great splendour, making it almost as light as day. I should be glad to learn whether any of the readers of SCIENCE-GOSSIP residing in other parts of the country have noticed this—to me—remarkable incident in the history of our singing birds, which most certainly has never come under my observation before.—*R. Standen, Goosnargh, Lancashire.*

HERRING FISHERY.—A correspondent in your March No. inquires how fishermen tell when herrings are in their vicinity. On this coast most of our cobbles cast their nets by night, and if any herrings are near, they can readily see the phosphorescence caused by this fish, which is generally very brilliant, especially if the night be dark and the herrings plentiful. Nine out of ten of our cobbles do not shoot their nets unless this "flame," as the fishermen call it, be visible. They can also tell the difference between "full" and "spawn" fish, a shoal of the former swimming like a single one, the whole body oscillating gently from side to side as they proceed, whereas, in a shoal of the latter, each fish is constantly on the move, darting restlessly about. This is by far the most useful sign of the approach of herrings, as the following can only be observed during the day, and are even then not very reliable; viz., that if the weather be warm and the sea smooth, a whole shoal will frequently disport on the surface of the water,

their shining bellies gleaming by thousands in the sun, and the innumerable splashes looking at a distance as though a heavy shower, or a sudden gust of wind, were ruffling the water. Seabirds too, usually follow the shoals, and if many are seen "working" together, it is a pretty sure sign that small fish are at hand, though they need not, of necessity, be herrings. —*G. W. L., Bridlington Quay.*

"FAIRY-FLAX."—I see in the January number of SCIENCE-GOSSIP, "E. L. R." asks, What plant is known under the name of Fairy-flax. I believe it is *Linum catharticum*, so-called from its great delicacy. —*A. F. Gissing.*

HARE-BELL.—The following is an extract from Dr. Prior's "Origin and Meaning of the Names of British Plants," on the derivation of Hare-bell:— Hare-bell, a name to which there is no corresponding one in any other language, is in all probability a corruption of some other word, perhaps "Heather-bell." Thomson, in his "Etymons," gives A. S. hœur, blue, as its origin; but there is no such word to be found. Prior also traces the derivation of *Hare*, A. S. "hara." Da. "hare." Ger. "hase." Skr. s'as'a, from s'as', spring.—*A. F. Gissing, Wakefield.*

HAREBELL.—In No. 159, p. 69, Mr. Holland seems wishful to know if Gerard, in his Herbal, gives any reason why *Scilla nutans* is called Harebell. I beg to say that he does not, at least in Johnston's edition of 1536. He calls the plant *Hyacinthus anglicus*, and in his index names it Haresbell; thus clearly showing that the animal is meant, and no allusion to the stem. *Campanula rotundifolia* he calls the small Bellflower. This latter in Cumberland is almost invariably, except in books, called Bluebells, and often Bluebells of Scotland—some allusion, I suppose, to Blue-bonnets. Hairbell is, no doubt, an appropriate name for Campanula, and so is Harebell; for as its slender peduncles are moved and shaken by every passing breeze, so is the fearful hare (*Lepus timidus*) agitated and stirred by every noise and movement around her. I may also mention to Mr. Holland that the Mountain Flax is in Cumberland often called Mountain Flocks. This shows how strange names are often introduced by substituting for the right term some better-known word similar in sound. The word flax is seldom used here: Line is the common name.—*R. W.*

WHITE HAIRBELL.—With reference to Mr. Tate's remark on White Hairbells, I may mention that my experience of albino flowers has been almost invariably the same as his. I have in my herbarium albino specimens of *Campanula rotundifolia*, *Calluna vulgaris*, *Stachys betonica*, *Geranium robertianum*, and others, all of which have indications of colour, which they did not have when living.—*Albert C. Coxhead.*

WHITE HAREBELL, &c. — On September 5, I gathered white flowers of *Campanula rotundifolia*, between Largrave and Malham, and they are perfectly white now when dry. I also found white flowers of *Lychius Flos-cuculi*, at Hawksworth, near Bradford, in July. White flowers of *Scilla nutans* occur regularly about here; also white *Erica cinerea*; but I believe this latter occurrence is not very frequent.—*William West, Bradford.*

WHITE FLOWERS.—A young friend found at Rhyl, in the late summer of last year, a flower of the *Scabiosa urbensis*, perfectly white. We have also met with a root of *Ononis arvensis*, the flowers of which were entirely *album*. The lovely little harebell, or bluebell, *Campanula rotundifolia*, I have often met with white, as well as blue; indeed, we had large tufts of both colours, growing in our garden. The *Scilla nutans* is also often to be met with white and even pink. We have from childhood been taught to call the *Scilla nutans* the wild hyacinth, and the *Campanula rotundifolia* the bluebell; this latter name is in Staffordshire mostly applied by the country people to both plants, without any discrimination.—*E. Edwards.*

LONGEVITY IN THE SLOW-WORM.—A very fine specimen was captured by me, near Beacontree Heath, in the year 1850, and was killed by an unfortunate mischance a few days ago. It had consequently been in my possession twenty-eight years. It was several years old when caught, and was in sound health up to the time of the misadventure which caused its death.—*C. Springham.*

TOAD AND GOLD FISH.—In my garden is a tank let into the ground, where it receives a regular supply of fresh water, and affords room for several fish, including some of the carp family, known as "gold fish." On 15th February last I saw one of the latter lying on its side, apparently ill or dead, and a toad just by its head. Reaching a stick, I touched the fish, and to my surprise found it was alive, but grasped *firmly* by the head in the front legs of the toad, which I endeavoured to dislodge. But although the fish struggled *violently*, the toad held fast, and at length carried the fish down among decayed leaves and vegetation in the bottom of the tank. To free the fish, I had to get my gardener to empty and clean out the tank.—*Horace Pearse, F.L.S., The Limes, Stourbridge.*

DREDGING.—"R. G. C." will find that if he dredges near shore from, say a small boat, the hempen tangles, invented by Captain Calver, are a good and simple substitute for the costly and often unsatisfactory dredge, such specimens as *crustacea* and *echinoderms* becoming easily caught, and frequently fishes and *mollusca*; but care is required to extract them from the hemp, into which they are often too much entangled, and thereby spoilt. Gosse's "Marine Zoology" is a useful accompaniment to a dredging expedition, where the above-named orders are being fished for.—*E. Lovett, Croydon.*

SNAKES AND BIRDS.—May I venture to say, in answer to the question in your SCIENCE-GOSSIP, whether the English snake eats birds or not, that I have known two instances in which a snake has been killed with a bird in its mouth. The one case was in Cornwall, when, with some gentlemen friends, I going towards Penzance, when a large snake met us with a bird in its mouth, evidently taking it home for its dinner. One of the gentlemen gave the snake a fatal blow with his stick; so we did not see the actual eating of the bird (but I think we should have hanged a man on less presumptive evidence that it was eaten). The second case was in our own garden, where the gardener despatched a snake on the manure-heap with a bird in its mouth.—*B. H. K.*

INTELLIGENCE OF THE FOX.—One of the Cumberland newspapers last October contained an account of a fox being chased for two hours by the Blencathra foxhounds on Skiddaw and the neighbourhood. The fox was raised from his lair at Lonscale Crag, and made towards Littleton, "thence over Lonscale Fell to the Skiddaw Little Man," the hounds being in full cry after him. Thence he ran at a terrific pace to the top of Skiddaw on to Rannel

Crag, through Southwaite Dale, over Ling Howe's Nook, to the Sandbeds at Bassenthwaite. About two hours had now elapsed, and the pace was beginning to tell on the poor fox when his intelligence began to be displayed in a remarkable manner. After crossing and recrossing a road he made towards a stackyard, but, failing to find there the shelter he sought, he took another direction for some distance; but again returned by almost the same route, until he reached a road on which a flock of sheep was being driven. Knowing that he had nothing to fear from these animals, and placing confidence in the driver, he deliberately took his place in the middle of the flock; and, measuring his pace with the sheep, in this manner he travelled with them for some distance. The means he had adopted to save his life might well have excited a feeling of pity and admiration at this remarkable act of intelligence, but the gratification of witnessing the poor animal mangled to death by a pack of ravenous dogs possessed greater attraction, and he was ruthlessly driven from the midst of the sheep, and compelled to devise other means for the preservation of his life. He made to a cottage hard by, and attempted to enter it, but was driven from the door by one of the female inmates. He then passed to the rear of the cottage, and threw his wearied and exhausted frame down on the sward instead. But his rest was brief; he was again aroused by his relentless pursuers, and, making a final effort for his life, he was shortly caught and worried to death. Has the Society for the Prevention of Cruelty to Animals no power to take cognizance of such inhuman acts as this? Here is an animal endowed with little short of human intelligence for the protection of his life, tortured for upwards of two hours, and then torn in pieces for the gratification of his persecutors. Cases twenty times less revolting than this are almost daily brought up by the Humane Society and punished. Burns, when he had turned up the nest of a mouse with his plough, and saw one of his labourers chasing it, indignantly exclaimed, in that beautiful poem to a mouse,—

> "I'm truly sorry man's dominion,
> Has broken Nature's social union."

It is no argument, that because the fox, to sustain his life may make free with pheasants, rabbits, and even barn-door fowl, he should be tortured for hours, and ultimately torn to pieces. It is his nature, and his life is as sweet to him as to us. There are other means for his destruction with comparatively little pain without this prolonged torture.—*Dipton Burn.*

AQUARIA.—I have kept a great number of Aquaria, both salt and fresh-water ones. I have often watched the sticklebacks, both salt and fresh-water, and both sorts are very fond of attacking other fish, particularly the fresh-water species. The latter attacked goldfish, roach, sace, minnows, and other kinds of fish, as well as newts and tritons. They nibble the tails and fins off the fish, particularly the goldfish, and the fish get diseased through it and pine away and die. I have lost a great many goldfish by their depredations. They nibble or bite the toes and tail off the newts: I have seen their tails bitten so frequently by them that there has been very little left of them. I should never advise any one to place them in a nice-stocked aquarium, and they should be kept out of small ornamental ponds where there are goldfish. If you wish to see how destructive they are, place some of those fish or animals in an aquarium that I have mentioned by themselves; you will then see that the sticklebacks will not let them rest a minute; they will worry the poor fish to death.—*A. J. R. Sclater, Teignmouth.*

BLACK BEETLES.—On looking over my old SCIENCE-GOSSIPS, I find cucumber peelings are recommended as a bait for black beetles. It is the custom in these parts to throw the peelings near their haunts, under the impression that it kills them; but this paragraph leads me to believe the cucumber merely allures but does not destroy the beetles. Can any of your readers inform me whether it destroys as well as allures them?—*Arthur Smyth, Parracombe.*

EARLY BIRDS.—Our local papers contain notices of a robin's nest containing five eggs, on which the hen bird was sitting on the last day of the year. This was between Watchet and Williton, Somerset. It is also stated that a thrush's nest with four eggs might be seen in a droveway at Ilminster, in the same county, the first week in the year.—*W. Macmillan, Castle Cary, Somerset.*

WHAT IS THE WHIPULTRE?—Can any of your readers say what tree Chaucer meant by the "Whipultre?" The word occurs in an enumeration of trees. All those otherwise mentioned are therefore precluded. *Vide* 2,925 of the "Knighte's Tale."—*G. L.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

A. L. (Nottingham).—It is a variety of common water-mint (*Mentha aquatica*).

W. K. (Leeds).—The light, or whitish seeds, are the product of *Cæsalpinia cariaria*, often named "Libi-dibi," probably now corrupted commercially into *Divi-divi.* We could only detect about two of the darker seeds: they must have trickled from the envelope.

D. S. (Ealing).—The brown spots on the under side of leaf of oak are generally called by village children "Oak-stars" and "Oak-spangles." They are not fungi, but galls produced by *Diplolepis lenticularis.* On the long (lanceolate) leaves you enclose, evidently a sallow, is a perfect fungus, now named *Melampsora salicina.* Early in the season it assumes a straw colour at this stage; it was formerly named *Lecythea sp.*, because it was supposed to be a distinct species. It is very common on poplars and willows the year through. The best work on British Botany is Hooker's "Student's Flora." You should get Davies on "Microscopic Mounting."

E. CLARK.—We are sorry you are not pleased with the return parcel of plants. With the exception of another botanical exchanger (a lady), all have expressed their high sense of satisfaction with their parcels, the labour and expense of arranging which have been very great.

A. H. H.—You will find full directions "how to preserve spiders," in an article by Dr. Dyce, under the above heading, in SCIENCE-GOSSIP, for January, 1868. In SCIENCE-GOSSIP volume for 1875 there is an article by our best spider authority, the Rev. Mr. Cambridge, on the same subject, together with several notes and queries relating to collecting and preserving spiders.

E. C. J.—There is no work as yet published on Australian Tertiary Polyzoa that we are aware of. Inquire of Mr. Robert Etheridge, jun., Geological Survey Office, India-buildings, Victoria-street, Edinburgh, who has worked on the subject. Your best plan would be to offer to exchange Polyzoa with C. Harris.

T. SHIPTON.—We should think you would be able to obtain the collapsible nozzled tubes by ordering them through any first-class chemist.

J. S., JUN. (Warrington).—Your sea-weeds are—1. a faded red plant, probably *Rhodymenia palmata*; 2. Fragment of some dried plant, species undistinguishable, covered with tufts of *Calothrix confervicola* and faded masses of *Jania rubens*: 3. Portion of *Halidrys siliquosa*, with tufts of *Sphacelaria cirrhosa*; 4. Probably *Gracilaria confervoides*; 5. Faded and stunted specimens of *Ceramium rubrum.*

X. Y. Z.—There is no examination for the degree of F.G.S. It is purely honorary. You had best apply to the Secretary, Burlington House, for further and fuller information.

J. H. Jones.—Communicate with the Naturalists' Agency, Salem, Mass., U.S.A., respecting exchanges of American lepidoptera. If you look over the Exchange column of some back numbers of Science-Gossip, you will find American lepidoptera offered for English.

E. S. M.—See article in present number as to the Antiquity of Man. You had best write to the Secretary of the Society for list of names, and inclose stamps.

A. S. K.—Get Landsborough's "British Seaweeds," published by Lovell Reeve. It has coloured plates, and the price is 10s. 6d. One of the cheapest and best is Grattann's "British Marine Algæ." It contains 205 capital engravings, and is written by one of our best algologists. The price is 5s. 6d. It is published at the *Bazaar* Office, 32, Wellington-street, Strand.

W. W. Walters.—You will find full instructions how to use the cyanide bottle in Dr. Knaggs's article on "Collecting and Preserving Natural History Objects," published by Hardwicke & Bogue, at 3s. 6d.

John Astley.—Your small insects (which came to hand alive) are springtails or *Poduræ*, and the species sent is *Achorutes purpurescens*. They belong to a distinct group of insects called *Thysanuradæ*. See articles (with illustrations of chief species) in Science-Gossip for December, 1872, and January, 1873.

M. G.—Woodward's "Manual of the Mollusca" is the best book of its kind yet issued. The price is 7s. 6d., published by Lockwood & Co. Any of the kinds of food mentioned would serve as "treats" to the pigeons.

T. W. (York).—You may obtain every article required for natural history purposes from J. Gardner, 246, Oxford-street, London.

F. H. A.—Thanks for note respecting *Gentiana acaulis*; we fear it will never occur as a genuine native. The *Sedum* resembled *sexangulare* very closely. It is difficult to tell the difference betwixt this species and *reflexum*, except by seeing the barren shoot,—then it is known at a glance.

G. C. D. (Northampton).—Thanks for *Carex*, which we hope to make use of. The rust on leaf of *Trifolium Molinieri* is a not uncommon fungus. It also affects several species of dock. It is the *Uromyces apiculata*, Lev.

J. C.—You will find in Sach's "Botany," translated and edited by Professor Thistleton Dyer and A. W. Bennett, and published by the Clarendon Press, the best treatise on Vegetable Morphology.

F. W. Morriss.—It is a common occurrence for the tortoise-shell butterfly to come out on warm sunny days early in the year. Such specimens have been hybernating, and the light and heat have revived them.

H. L. Graham.—Your moss is *Hypnum denticulatum*.

W. Thomson.—Your specimens of mosses are:—*Pottia truncatula*; 2. *Hypnum denticulatum*; 3. *Homalia trichomanoides*; 4. *Anomodon viticulosus*; 5. *Hypnum undulatum*.—R. B.

V. G.—Your micro fungus is *Ceuthospora phacidioides*, Grev.

S. A. B.—The fungus on leaves of box is *Puccinia Buxi*, D. C.

EXCHANGES.

Mounted slides of *Craterium pyriforme* in exchange for well-mounted Slides of interest.—S. C. Hincks, Farnham, Surrey.

A quantity of Balsam Mounts, of common but interesting micro objects, for Coleoptera, Birds' Eggs, or anything interesting.—C. W. Lawton, Essex-road, London.

Isoetes hystrix, *Helianth. guttatum*, *Orobanche cærulea*, and *Gymnogramma leutophylla*, &c., for *Lathyrus palustris*, *Galium Anglicum*, *Arnoseris pusilla*, *Carex tomentosa*, &c. —G. C. Druce.——Also G. C. Druce, Northampton, will be pleased to hear from the contributor to Exchange Club who sent specimens collected by Mr. Notcutt.

Asterina gibbosa (small) for foreign Echinus Spines.—J. Keogh, 25, Camperdown-place, Yarmouth.

First two vols. Cassell's Birds, in red leather, 12s. 6d. Also wanted, first 12 parts, Morris's Birds, 2nd edition, exchange for Morris's Butterflies, 1st edition, 12 parts.—E. Evans, Brinscombe, Gloucestershire.

Well-mounted slides of Polycystina and rare Foraminifera in exchange for others, or Lepidoptera.—Phonographer, 78, Lozell's-road, Birmingham.

Living Ferns and Alpine Plants, interesting microscopic Slides and material, &c., in exchange for Section-cutter, really good Slides, or material. Please see my offer in March number. List free.—T. McGann, Burren, Ireland.

Birds' Eggs.—Wanted, oological correspondence, and exchange with some of the numerous American, Colonial, and Foreign readers of Science-Gossip. All letters answered. William H. Armitage, Etruria Villa, Crookes-road, Sheffield.

Wanted, Mounted Microscopic Objects of every description for mounting materials. Send specimen and state wants.—E. Atkins, 200, Essex-road, Islington, London.

Foreign Shells.—Duplicates, mostly of Japanese, Chinese, Burmese, Java and Philippines, Australian. Desiderata: principally North and South American, West Indian, Mediterranean, Spanish, French, Algerian, and Egyptian; also Duplicates of about fifty sorts of British Land and Fresh-water Shells for the above desiderata. Exchanges invited.—W. Sutton, Upper Claremont, Newcastle-upon-Tyne.

H. lamellata, *H. aculeata*, *H. pygmæa*, *Z. radiatulus*, and *H. fusca* for any good *Anodonts*, *Unio tumidus*, or *Pictorum*, from any place where I have not got them, in England.—J. Whitwham, Cross-lane, Marsh, Huddersfield.

Many species of British Shells, Sea, Land, and Fresh-water, offered in exchange for foreign Clausilias.—Address: F. M. Hele, Fairlight, Elmgrove-road, Cotham, Bristol.

A pair of Telephones in exchange for Microscopic Slides, well mounted.—L. Hawkins, 7, Castle-Down-terrace, Hastings.

Small collection of Coleoptera, in good order, or well-mounted objects, for cabinet, specimens of Flint Sponges from the Chalk.—Address: R. H. E., Mr. Morton's, 165, Lewisham High-road, S.E.

For slide, with scales, of a rare and supposed new species of Lepisma, send well-mounted slide to James Simpson, 15, Prospect-place, Dumbiedykes-road, Edinburgh.

Forty species of *Hepaticæ* (named), *F. tamarindifolius*, *G. squarrosum*, *T. abietinum*, *H. hians*, offered for foreign Marine Algæ.—E. C. J., 12, Church-road, St. Leonards-on-Sea.

A few rare British Birds' Eggs to exchange for rare British Birds' Skins or Eggs, not in collection. All letters answered.—R. Standen, Goosnargh, Preston, Lancashire.

Send Botanical or prepared Entomological material in exchange for a healthy plant of Valisneria and Capsules of Whelk Egg for Polariscope. Other material for exchange.—Tylar, 165, Well-street, Birmingham.

Send really good unmounted Material of any kind (except diatomaceous earths), when well-mounted Slides or Material (as preferred) will be forwarded in exchange.—J. Sherlock, 32, Exchange-street, St. Helens.

Rare Mosses, including *Tortula Hornschuchiana*, *Hypnum triquetrum*, &c. (all in fruit), for well-mounted Micro Slides.—T. Watson, Bank Parade, Burnley.

Wanted, Lepidoptera (perfect or imperfect insects) for Polyzoa from the Coraline Crag; Eggs, mostly sea-birds', and other objects of interest.—F. M. Ogilvie, Sizewell House, Leiston, Suffolk.

London Catalogue, 7th edition, Nos. 135, 209, 239, 556, 577, 704, 709, 769, 810, 838, 975, 1031, 1284, 1297, and others, in exchange for Nos. 1265, 1267, 1270, 1279, 1286, 1292, 1293, 1298, 1299, 1300, 1302. List exchanged. J. Tempère, 23, Crouch-street, Colchester.

In exchange for well-mounted slides, send Fossils or objects relating to Marine Zoology.—C. P. Ogilvie, Sizewell House, Leiston, Suffolk.

Wanted, good gathering of *Pleurosigma angulatum*, for Diatoms, Slides, Material, or Cash.—Eug. Mauler, Travers, Switzerland.

A bottle of Preliminary Varnish, and one ditto of white or coloured Enamel Cement, for good unmounted material. Micro. Fungi, Diatoms, Marine Algæ, &c., preferred.—Henry Vial, Crediton.

BOOKS, &c., RECEIVED.

White's "Natural History of Selborne," edited by Prof. Thomas Bell, F.R.S., in 2 vols. London: Van Voorst.

"Proceedings of the Literary and Philosophical Society of Liverpool," vol. xxxi. 1876-77.

"The System of the World," by W. L. Jordan. London: Hardwicke & Bogue.

"The Freedom of Science in the Modern State," by Rudolf Virchow, M.D. London: John Murray.

"Land and Water." March.

"Chambers's Journal." March.

"Botanische Zeitung." February.

"American Naturalist." February.

"The Naturalist." March.

"Midland Naturalist." March.

&c. &c. &c.

Communications have been received up to the 10th ult., from:—F. K.—J. F. R.—M. G.—M. H. C.—T. W.—H. B. W.—J. E. J.—F. C. R.—T. E. D.—F. H.—E. W.—E. D. M.—J. H. R.—D. D.—G. C.—J. D. O.—C. W. L.—Dr. R. H. W.—G. C. D.—H. L. G.—T. McG.—S. C. H.—A. S.—G. N.—C. P. O.—F. M. O.—G. C. D.—H. G. G.—H. L.—G. P.—W. T.—F. W. M.—T. S.—Prof. J. T.—T. W. —W. W. W.—J. H. K.—J. P. S.—R. S.—J. A.—G. W. L.—E. H.—E. C. J.—M. R. D.—J. S.—E. S. M.—J. L. H.—A. S. K.—E. E.—J. R. S.—F. M.—R. H. E.—R. B. C.—B. H.—H. P.—H. G. W.—S. A. B.—L. H.—C. W.—J. W.—H. W. T.—F. M. H.—T. B.—W. H. A.—E. C.—J. K.—A. B. —T. W. D.—F. A. A.—A. J. R. S.—A. S.—H. A. F.—X. Y. Z. —A. H. H.—R. W.—Dr. C. C. A.—W. S.—M. K.—E. A.—H. B.—A. B.—&c. &c. &c.

THE MIGHTY DEEP.

By A. RAMSAY.

ACCORDING to E. Forbes and others, it is a convenient hypothesis to assume that each species has arisen from a single centre, so that each species, each genus, and each fauna occupies an area which is complete in itself. Thus, a species may spread from a particular centre as far as it can find suitable conditions. If such conditions were universal, there is no reason why the species should not spread into every sea and exclude all other forms. There are, however, always restrictions, so that each species has a limited distribution, and if it spreads over most of the space occupied by the ocean, it generally occurs more or less sporadically, owing to alterations of condition having driven it from certain parts. The distribution of each species is, in most cases, a clue to the distribution of the particular set of conditions under which it lives. Hence species which find the conditions for living on the sea bottom in deep water will spread over that area of deep water so far as the suitable conditions are sufficiently continuous. If there is a break in the distribution of such conditions, whether caused by the shallowing of the water or in any other way, the further extension of the species will be arrested. Most marine organisms have powers of locomotion during some portion of their lives, a circumstance which, combined with the transporting power of currents, must not be overlooked. The continuation of the species in time implies the continuance of the conditions suitable to it, a circumstance which should always be present to the minds of both palæontologists and geologists when endeavouring to synchronize old sea bottoms. In all oceans of the present period, and, as may be assumed, in all oceans of past periods, there is and has been a similar concurrence of physical conditions. The main difference in time have been variations in the distribution of each set of conditions relatively to one another, while both in time and in space these have been accompanied by variations in the facilities afforded to each species in passing from one area to another. This has caused local groupings of species into faunas and floras, and the preoccupation of the ground frequently prevents a species from localizing itself where the physical conditions are favourable for it. This preoccupation is often a barrier to the spread of a species. Generally the persistence of a fauna associated with a particular set of conditions, whether in space or in time, indicates the persistence of these conditions. For instance, during the post-pliocene period, a particular assemblage of mollusks frequented the shallow waters of the British isles. All these, or at any rate nearly all, now occur on the east shore of N. America; while a much smaller proportion exist on the present shores of Britain. Currents will not account for this alteration in the distribution; but the existence of a line of shallow water on a coast extending from the British isles to America would. The destruction of this coast-line and modifications of the conditions on the British shores with the continuance of such conditions on the shores of America would explain the remaining phenomena. This illustration (which is only one of many that could be cited) shows that the occurrence of the same fossils in the strata of two distant areas indicates the occurrence of similar conditions in both areas, but not that the faunas are synchronous: the question of contemporaneity should be based on other evidence. So, again, the relative ages of strata cannot be deduced solely from the similarity or dissimilarity of their fossils. It is essential that the conditions connected with each be taken into account, in order to determine this point. If all the species now living were regarded as fossils, and if local lists were made of them with a view to comparing them with older faunas, some would have a more ancient facies than others; and a geologist would, we suspect, assign them to different periods. Facts indicate that geological provinces existed in past periods analogous to those of the

present; but the knowledge we have of the old sea bottoms is partial, so that it sometimes happens that while the known strata representing one great period indicate the prevalence of one set of conditions, those representing the succeeding one indicate the prevalence of a widely different set. The difference in these faunas is frequently considered to be that of the entire fauna of the two periods, whereas it may really be that of the faunas belonging to different conditions of the ocean of different periods, not the faunas belonging to the similar conditions of those seas. For instance, we know that the fauna of the deepest parts of the Atlantic Ocean of the present period is markedly different from that of its shores; but probably if those species had represented a past period in geology they would have been assigned to different ages, if there were no stratigraphical evidence to prove their contemporaneity. The distribution of a species in time is also assumed to be continuous, so that when it dies out it never recurs again, but its place is often taken by a representative species. Those species which can endure under many conditions generally have an extensive range both in space and in time, and are by themselves of comparatively little use in synchronizing marine strata. Zones and horizons are best marked by the maximum development of one or a few species in association with the same fauna. Such zones are generally of local importance, and do not apply to the whole ocean of the period; and the synchronizing the fauna of different areas is the most important work which the student of the ocean has yet to perform. The sea is a barrier to the dispersion of many land animals and plants; and hence facts as to the distribution of these afford a clue as to the position and persistence of oceanic basins. The geological provinces of the land are usually separated by wide and deep oceans.

Marine and non-marine forms are sometimes mingled in the same stratum. This may be naturally effected in many ways. In deep inlets of the sea, into which rivers discharge themselves, it frequently happens that the surface water is fresh enough for the existence of fresh-water species, while the deeper water is tenanted solely by marine forms. When the individuals die, the fresh-water and marine forms are mingled in the same deposit, and marine fishes may have the remains of fresh-water species in their stomachs. Land shells are sometimes blown on to the shore between tide-marks, and may thus be associated as fossils with the littoral marine fauna. The sea-water flows up estuaries below the river water for long distances; and in many cases the alluvial deposits about the mouths of large rivers are largely composed of marine microscopical organic remains. On the other hand, similar remains of terrestrial forms of life are deposited on the sea bottom as a consequence of dust-storms and dust-deposit generally on the surface of the sea. In many places springs of fresh water well up on the sea bottom both near to and far from the shores; and as these persist for lengthened periods, it is not impossible that they may be the means of distributing fresh-water remains over a marine area. However, there appears to be no case on record of any species of organisms having been found having such areas for their special habitat; but this may arise from no one having undertaken any search for the express purpose of obtaining such forms, should they exist. As occurrences of this kind (excluding the surmise relative to submarine springs) are known to happen now, we should not overlook the possibility of their having occurred in past periods.

The contour and age of old seas may then be inferred from three kinds of evidence: (1) Lithological, or the superposition, nature and origin of sediments; (2) Physico-geographical, or phenomena relating to elevation and subsidence of the earth's surface, volcanic eruptions, position of land, denudation, and others which need not be specially mentioned; and (3) Biological. The inferred age of any particular sea-bed ought to be based on facts belonging to all three kinds of evidence, and an adequate knowledge of old sea-beds is not attained until we have acquired evidence as to the fauna of the various zones and provinces of each period. Our knowledge of the seas of past periods is but fragmentary; but by attending to the considerations suggested, we shall be enabled to see more clearly where the deficiencies are. Facts as to deficiencies or breaks, whether stratigraphical or biological, are of great importance; such breaks are generally associated with lapse of time, because changes require time for their development; and generally the greater the change the longer is the time necessary to develop it. But such changes are primarily associated with change of conditions, and different conditions may abruptly succeed each other; while similar conditions may recur on the same area after a long interval of time without any intervening strata. Hence stratigraphical breaks do not always coincide with nor are proportional to biological breaks. The cause of such breaks is a matter for inquiry in each particular case, and it is only from data thus acquired that one can judge of the probable lapse of time indicated.

PRIMITIVE MAN: HIS TIMES AND HIS COMPANIONS.

By the Rev. J. Magens Mello, M.A., F.G.S.

No. II.

As man advanced in civilization, or, as amongst ruder tribes more cultivated ones made their appearance, the forms of his implements became more and more perfect, and better adapted to their purposes. Bone would be at the same time more frequently used; and we have proofs that this was the case in the fact that in the floors of some of our caves, notably in those of Creswell and in the French

caves of St. Martin d'Excideuil, whilst in the lower beds we get the rudest tools made of pebbles or flints fashioned in the roughest way, overlying these in the higher deposits are found more elaborate ones, accompanied by bone needles, harpoons, arrow-heads, and other implements. Another point worthy of notice in connection with these primitive men is that they were not all of them such utter savages as we might have supposed. Evidence has been gathered, showing that even the higher forms of art had followers in those early ages of the world's history; bones skilfully engraved have been found in some caverns, especially in those of the Dordogne in France, and in this country the Robin Hood Cave at Creswell has yielded one solitary British example. On these bones, fragments of rein-deer antlers, or ribs, are seen roughly, yet very beautifully, drawn; figures of rein-deer, Arctic foxes, horses, and even of the great woolly mammoth, all perfectly recognizable, and showing beyond all doubt that the engravers must have been thoroughly familiar with the forms of the animals they drew so well, and that therefore man and these animals must have lived side by side in these countries. These men were essentially hunters and fishermen, and it is not improbable that they lived very similarly, in most respects, to the Esquimaux of to-day; so much so, indeed, that it has even been suggested that these latter may be their remote descendants. These men, then, who chased the rein-deer and the horse, the bison, and the urus in the forests and plains of Northern Europe, and harpooned the fish in its rivers, were the first men of whom we have any positive traces; and because they used as their chief implements those made of stone, they are called the Palæolithic or Old Stone Men, and the age in which they lived is known to geologists as the Palæolithic age. After their age, and when they lived it appears impossible to guess at, great changes, involving a long lapse of time, must have taken place. The climate became milder, England sank lower, and the sea again made its way between us and the Continent, and these islands became, in some respects, what they are now. The animals of the Pleistocene age gradually disappeared; some died out altogether, others, such as the lions and the hyænas, retreated to more southern climes, and some others lingered on for awhile to be extinguished in time by the repeated attacks of man.

A new race of men have now made their appearance; different in their physical conformation, as shown by the shape of their skulls, &c.; different also in their degree of civilization and in their companionships. These were the men of the Neolithic or New Stone age. Stone was still used for tools and for weapons; but the flint or other material was far more skilfully wrought, and it was not only chipped into shape with the utmost perfection, but was also frequently ground to an edge more or less polished. These Neolithic men introduced into Europe many of the animals which are now familiar to us; the domestic hog, the small ox, called the Celtic short-horn; the sheep, goat, and others. They also brought with them the cereals, wheat, &c.; and so man, from having been merely a hunter and fisherman, at last settled down into a dweller of more fixed habits, and was, in his way, an agriculturist and shepherd; he was also a bit of a potter, rude fragments of earthenware vessels having been found not unfrequently with remains of this period. Neolithic man, although not so essentially a hunter as his predecessors, yet necessarily depended in a great measure on the chase for his sustenance. Hares, horses, stags, oxen, goats, and other animals would supply him with abundant food.

It has been thought, with considerable probability, that traces of these Neolithic men still exist amongst the populations of Europe; the Basques of Spain, and an allied race in the South of France, as well as in Brittany, and the small swarthy Welshman of Denbighshire, and others of a similar type in Ireland, are possibly the remote descendants of these primitive men.

When the next tide of human immigration swept over Europe, it brought with it an art destined ere long to sweep the old stone implements away. The incoming men were those of what has been termed the Bronze age. Their tools, and weapons, and ornaments were largely made of that alloy of copper and tin we call bronze. Poorer people would doubtless continue for awhile to make use of stone implements; but the metal was the characteristic feature of the period. A small race of men were these users of bronze, as is witnessed to by the smallness of the sword-handles, bracelets, and other objects; and judging by this and by symbolical ornamentations sometimes seen in their works, they would seem to have entered Europe from the East, and to have been either an Asiatic or Egyptian race. It may be observed that the Bronze men were in the regular habit of either burning or burying their dead, whose remains are frequently met with in tumuli.

Magnificent weapons were many of these bronze ones. Finely-shaped axes, called celts, swords and daggers of very peculiar and perfect forms, spear-heads, and knives, bracelets, pins, and other ornaments have been found in large numbers in Denmark, in Germany, Switzerland, and Ireland, and in a somewhat lesser quantity in this country. Man by this time had, at any rate, for the most part, forsaken the cave-dwelling for the hut; he had even learnt to build himself villages; these were often, for protection, skilfully constructed on piles, in lakes, or were walled round; the remains of lake dwellings, some of them even belonging to the earlier Stone age, have been found in considerable numbers in the Swiss lakes, and also in Ireland. The man of the Bronze age had become a weaver as well as a potter;

rude fabrics of flax or even of straw have been discovered amongst the relics of his times; and his pottery shows a considerable advance upon that of Neolithic man.

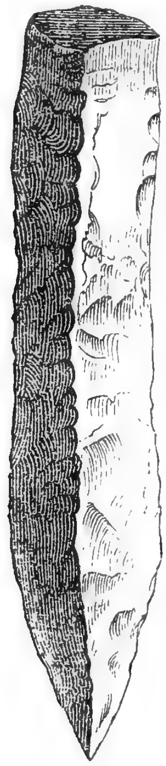

Fig. 66. Flint Dagger (Neolithic), Denmark, ½ size.

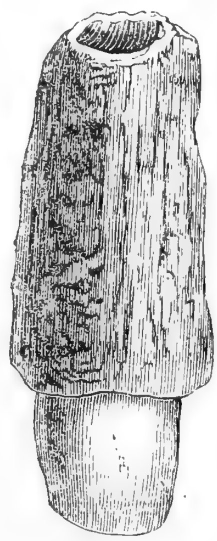

Fig. 67. Hafted Implement (Neolithic), Schaffes, Switzerland, ½ size.

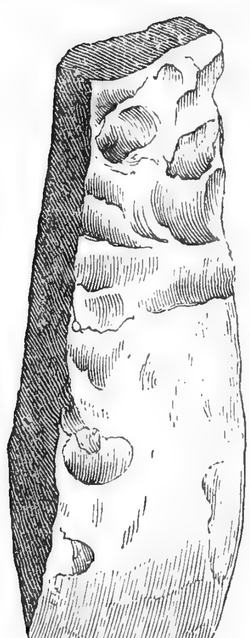

Fig. 68. Flint Axe (Neolithic), Denmark, ⅓ size.

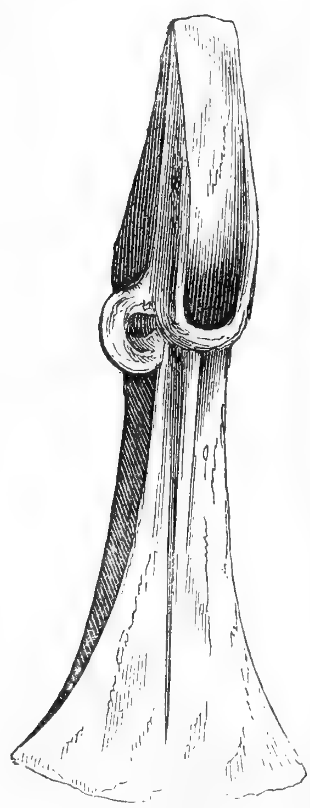

Fig. 69. Bronze Celt (Bronze age) Chesterfield, ½ size.

When the Bronze age passed away, which it gradually did, a new metal gave its name to the succeeding period; that metal was iron, known in Europe, and used before the Roman invasions outside Italy, yet doubtless the Roman armies helped to make its use more common, even if they did not actually introduce it into some countries. The men of the Iron age may be looked upon as the immediate forerunners of the men of to-day, who are most undoubtedly users of iron, the metal of our modern civilization.

Thus, then, age after age of man has passed away; who shall say how many generations have lived and died since the days when men, clothed in skins, roamed from cave to cave, as they followed the chase, and contended with the mammoth and the hyæna, and the cave bear, and their congeners?

What a tale of progress has to be recorded since then, what a wondrous history of change! Where the forest and the morass once stretched, waving cornfields now meet our eye; where the savage beasts of prey fought over their victims, the flocks and the herds of our domestic animals peaceably feed; and man has ever advanced, step by step fighting his arduous battle, and he has won victory after victory, over nature, over circumstances, over himself, fulfilling his lofty mission of Lord of Creation. And as man has advanced in civilization, ever-increasing powers seem to have been made his own, as it has been well shown, new sources of strength, new means of overcoming the difficulties of his position; nay, even new senses may be said to have been put within his reach. The telescope and the microscope have given him new eyes; the printing-press has given him new ears with which to hear the voices of all ages; machinery has given him new hands. Thus shall man press forward, we may surely hope, out of all the darkness of the past; and at length emerge through the struggles and imperfections of time into the perfection of eternity.

ORNITHOLOGICAL ESSAYS.

No. 1.—The Kestrel.

(*Falco Tinnunculus.*)

By T. W. Dealy.

GENERAL INTRODUCTION, HABITS, ETC.

THIS well-known and widely-distributed little falcon is often confounded with the Sparrow-hawk (*Accipiter nisus*), and has often to pay the penalty of death for the pillaging attacks of that noted farm-yard devastator. It is counted by the gamekeeper and agriculturist as "vermin," and a great destroyer of game and bird life generally, while, in reality, it is one of their stanchest friends, as it rids them of the numerous mice, beetles, reptiles, &c., which otherwise would injure the crops. Although the Kestrel is such a great destroyer of mice (thus benefiting the farmer), *it is a hawk*, and for this reason the land must be rid of it. We have often heard of the land being overrun by multitudes of

mice, beetles, and such like, when this or other equally useful birds have been so ruthlessly exterminated; but I have just read of a recent instance which ought to act as a warning to all farmers. It has been stated that the borderlands of Scotland are being overrun by immense numbers of mice, the smaller mammalia, beetles, and such like destructive creatures, and that the farmers there are encouraging these hawks to stay, being now fully convinced of the folly of destroying them.

The Kestrel has a great number of provincial names, but the one by which it is commonly known is that of "Windhover." It acquires this suitable appellation on account of its hovering or poising itself on outstretched wings in mid-air. In Sweden, "Old Bushman" says it is named the "Torn falk."

It may easily be seen that the Kestrel is not the bird's enemy whenever one appears in the vicinity of a flock of birds, for, instead of the hurry and precipitation so apparent on the approach of that dreaded little tyrant, the Sparrowhawk, the birds quietly pursue their peaceful duties, as if there were nothing extraordinary or to be feared in the Kestrel's presence. At times, Swallows (*Hirundidæ*), actuated by playfulness or a desire to tease and torment the "Windhover," will mob it in the same manner that they do the Sparrowhawk, and, like the latter, it will sometimes retaliate, and, from being pursued, will itself become the pursuer.

Keepers place traps in likely situations, near the nest and elsewhere, in which to entrap this bird. A keeper in the habit of doing this, on going his daily rounds to visit his traps, perceived a Kestrel in one of them, which, on seeing him (not liking the prospect of having its neck twisted), made strenuous exertions to regain its former freedom, and was so far successful that it escaped, leaving, however, about half of one of its legs attached to the trap.

The "Windhover" may easily be distinguished from the Sparrowhawk: (*a*) by its hovering in the air, which the latter does not practise to such perfection as the former; (*b*) in straightforward flight it has neither the dash nor the rapidity so noticeable in the Sparrowhawk. It flies along gently, while the Sparrowhawk sweeps rapidly on, now swooping at this, then at that. (*c*) When seen off the wing, the "Windhover" is also easily known by its inclined and rather stooping posture, while the Sparrowhawk stands "as straight as an arrow," bidding defiance to everything by all its movements and actions. Even the uncouth country-lad can perceive the difference between these two, for, on asking a little rough-headed boy on the outskirts of Sheffield if there were "any hawks about there," he replied, "Which hawk do you mean; the one which catches pigeons, or the one which stands still in the air?"—by the former, meaning the Sparrowhawk, and the latter, the Kestrel. The Kestrel takes great delight in tormenting other birds,—above all, the Owl (*Strigidæ*), which appears to be the "laughing-stock" (if I may so use the expression) for all birds. The cry of the Kestrel is a strong, wild, ringing note, which becomes harsh and loud on the threatened approach of any danger to either its young or its eggs.

FLIGHT.—The flight of this bird is very light and airy. Generally, it flies at a moderate distance from the earth, but during, or rather on, the choice of a building site it soars high up in the air, when its actions are most elegant. The question then arises, "What is the Kestrel's object in soaring so high?"

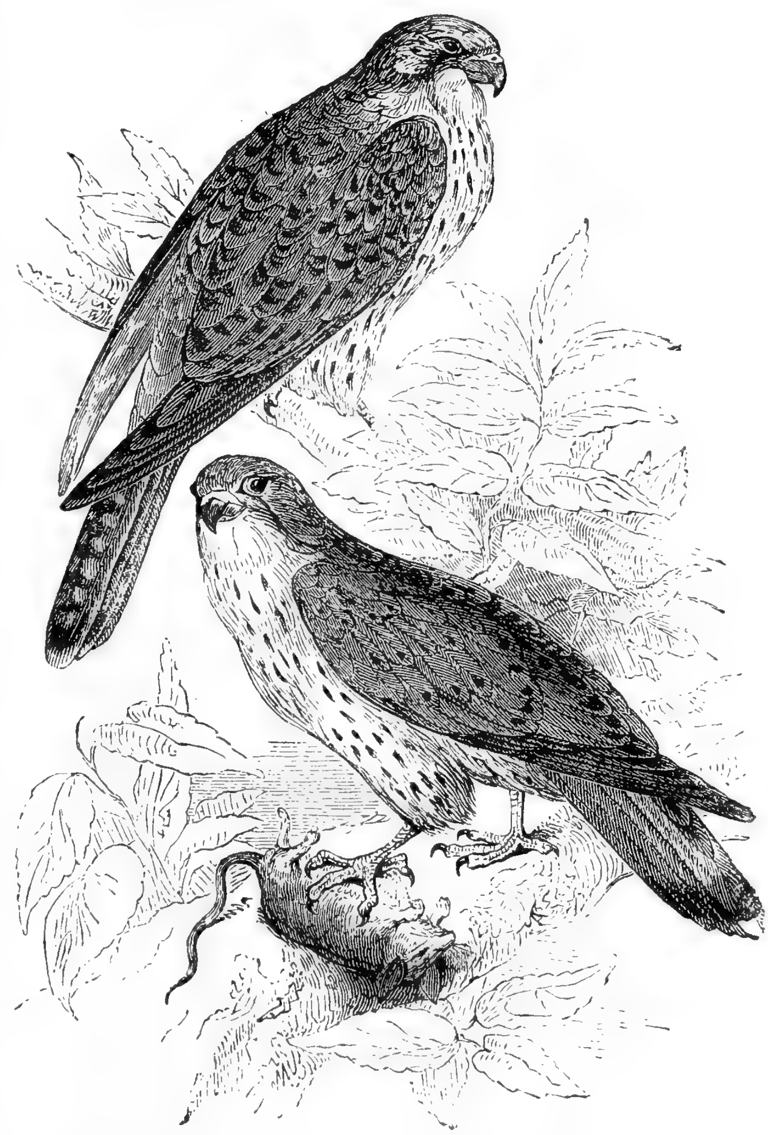

Fig. 70. The Kestrel (*Falco tinnunculus*).

"Is it seeking to discover food from so great an altitude?" No. It is the joyousness of the bird which prompts its lofty flight and graceful evolutions so high up in the heavens. When on the "look-out" for sustenance it flies at a moderate elevation, that it may drop down suddenly and unexpectedly on its prey and secure it before it has sufficient time to escape. If the "Windhover" attempted to descend (even were it possible for it to discern its prey from the great height to which the Kestrel often ascends) its intended victim, startled by the rushing noise which the bird's velocity causes in descending, would have time to escape the talons of its would-

be captor. Kestrels are very early risers, and are busily employed procuring food almost as soon as night rolls back her gloomy mantle and the wide east is tinged with the rosy hues of the rising sun, and pursue their vocations until it becomes dusk; and even then, long after the brilliant orb of daylight has disappeared in the far-away ruddy west, and the soft twilight of a summer's evening has overspread the country, they may be seen lightly skimming over the surface of the earth in search of food. As the compact body, great extent of wing, and fan-like tail of the Kestrel indicate, it has great command of itself in the air, making long sweeps and elegant curves in the ethereal regions. It is, indeed, a beautiful performance, and one we all delight in witnessing on a fine, clear summer's day, the Kestrel, quite at its ease, with nothing in the blue sky above but itself; its movements so unconstrained, and withal so replete with joyousness, as it revels in the celestial atmosphere in perfect harmony with the surrounding landscape. The wings and tail are expanded, and seem scarcely to move as their owner ascends and descends in graceful curvets. Now it takes a longer and a higher sweep than usual, and then, coming low, keeps on circling, now here, now there. Suddenly it stops! Probably it caught a momentary glance of some small animal! No! It again resumes its flight, again it is wheeling majestically aloft! It hovers again! What a beautiful object! How pleasing are its actions, as it "stands anchored," as if suspended by some invisible cord from on high! Its head is turned a little on one side, its tail spread out like a lady's fan; it is watching with its keen eye some small animal it intends to catch, probably a field-mouse little aware of the fatal danger which menaces it. In what fine style it comes down on that unfortunate mouse, which it soon bears away in its talons, to its craggy fastness in yon distant wood, there to be torn to shreds by four or five hungry young "Standgales." When the Kestrel is hovering, its wings, although to the naked eye they do not appear to move, are in a perpetual quiver. Suppose the Kestrel be unsuccessful in one attempt, it repeats its efforts, and so on, until it reaches "home." But there is not a field, valley, pasture, or any place at all likely to furnish it with food, which it passes without a strict search. The beauty, smoothness, and facility with which all these evolutions are executed are beyond the power of the pen to adequately describe. No! You must go and search for it amidst its haunts, and watch it in its retreats, before you can fully appreciate the character of this bird. Sometimes we can just discern it like a mere speck on the horizon winging his way slowly under the clear, blue canopy of heaven. At other times it moves along at an immense height until it disappears beyond the verge of the distant horizon. In fact, on the wing, this bird appears indefatigable.

What would be the value of scenery were it not enhanced by the presence of birds? How dreary and desolate, how desert-like would be the vast expanse of heather-covered moors without the hoarse cackle of the Red Grouse (*Tetrao Scoticus vel Britannicus*) or the Curlew's (*Numenius arquata*) solitary cry! What would be the aspect of our woods were we not in Spring-time, and, indeed, throughout the Summer months, to see the Kestrel hovering over its leafy bowers; or what of such diversified scenery as is to be met with in and about the "Peak district," were we not to meet with the "Standgale" amidst its fastnesses; or of the lakes, were not the still solitudes to be awakened by the plash of the water as the Coot (*Fulica atra*) or Moorhen, startled by the intruder's presence, dashes away to gain shelter among the many islets which dot its surface; or the shrill piping whistle of the Sandpiper (*Totanus hypoleuchos*) as it hastily wings its way across the watery expanse, to some other part? Were the world to be deprived of birds, it would lose one of its most powerful charms.

MIGRATION.—We have now arrived at the most interesting, but, at the same time, vexing portion of the history of this bird, viz., its migration. Does the Kestrel migrate wholly or partially from Britain? or does it merely move to other localities in our island more congenial to its habits? I have been much interested in this question, and have studied it deeply,—at least, as regards the immediate vicinity of Sheffield. It has proved a most interesting study. We all know what a distinctive feature are the elegant aërial evolutions of this bird in our summer scenery, and how blank seems the wood which is not inhabited, or, at the least, its neighbourhood frequented, by a pair, or more, of these beautiful little falcons. After the breeding season, when the young have been reared and are able to fly, we see them very often hovering over the waving golden corn-fields, or otherwise engaged in search for food. Then, after a brief interval, they suddenly disappear without any warning, and we do not again see them until their appearance in early spring. The period of departure, of migration, varies, according as the weather regulates. If winter sets in early, they "go away" about the latter end of September, but if the season be fine and open, they may prolong their stay until the earlier portion of October, and by the end of that month not one is to be seen. Whither are they gone? Happily the days have gone by when people were deluded by the supposed fact of birds hiding in holes, and there remaining in a dormant condition until spring's verdant call awoke them. There is but one conclusion. It was Charles Waterton's opinion that the majority of these birds migrate to other more southern countries, leaving here, according to his observations, about October. He had excellent opportunities for the observance of their habits, and yet he never saw them in winter after their final departure. Certain it is that we see but very, very

few of these birds from October to the middle of February. In my opinion, they do migrate wholly to other countries. Coming from the North and joining those in the south of Britain, they assemble, cross the Dover Straits, and, although numbers may stay in the provinces of central France and northern Spain, I have reason to believe that the immense majority cross the Mediterranean along with the numberless birds that periodically do so, to the northern shores of Africa, whence they commence their return during the month of January, arriving in Britain in the course of the succeeding month. The few (and they are but few) exceptions met with during the winter months only tend to prove this, and we must treat their appearances as those of the casual swallows which often appear at unseasonable periods.

FOOD.—As I have before said, this bird is not so destructive to poultry or game as is the sparrowhawk. It is also a much more sociable bird, and is more frequently seen near the habitations of man than the former. Its food consists of the smaller mammalia, such as rats and mice, also beetles and other destructive insects. Charles Waterton says that it consists "almost entirely of mice." For the vermin this bird destroys, its life should not be sacrificed as it is by gamekeepers, who, almost without exception, seem to have the most ungovernable aversion to all kinds of hawks. A great observer of the economy of birds, Mr. Booth, says, "The rats alone which these birds destroy while procuring food for their young would commit more, ten times more, damage in one year than a pair of Kestrels could in their joint lives." The Windhover does, indeed, occasionally have a change in its diet in the shape of a small or unfledged bird, and, as sure as it does so, it is either caught or seen "red-handed" by the keeper, who, having seen its partiality to birds, *firmly believes* that all its food consists of such, and, acting on this illusory belief, he exterminates this really useful little hawk and points out with evident satisfaction the ominous row of Kestrels suspended in a conspicuous position in his "museum." *

Mice are swallowed whole, the indigestible parts being afterwards cast up in the form of pellets. Insects are dexterously caught while on the wing, being clutched with either foot and adroitly conveyed to the mouth without at all impeding the flight.

REPRESENTATION IN OTHER COUNTRIES.—Though not found in Australia, the Kestrel's place is well supplied by the Nankeen Kestrel (*Tinnunculus cenchroides*, Gould). As before mentioned, the Kestrel's flight is very buoyant, but what must that of its Antipodean representative be, of which Gould says, "The flight of the Nankeen Kestrel differs from that of its European ally in being more buoyant and easy"? In North America this bird is partially represented by the American Sparrowhawk, which partakes of the character of both the Kestrel and the Sparrowhawk.

DISTRIBUTION.—It is the commonest of the Falconidæ which frequent our isles. Charles Waterton had numerous Kestrels in his park; he, himself, visited in 1835 no less than twenty-four nests, all having Kestrels' eggs in them. I have never since heard or read of so many being found in so small a space, but, of course, he had them strictly preserved. Around Sheffield its nest is not found as frequently as that of the Sparrowhawk, although I have seen the bird oftener. In many parts of Lincolnshire it is also very common. It is very frequent in Scotland, breeding mostly on the precipitous and craggy rocks which fringe its shores. In Ireland, Mr. Thompson says, "It is common and indigenous to suitable localities throughout the island." It is found in most European countries, even as far north as Lapland, where "Old Bushman," in his trip up there in 1862, procured specimens of both skins and eggs of this bird. Specimens of it have also been sent from all portions of Asia and Africa.

NIDIFICATION.—One cannot fail to be struck by the facility with which the "Standgale" adapts itself to places of nidification. In sylvan localities it constructs its nest mostly on a tree, but if the spot chosen be a wild, mountainous, but picturesque district, either on the coast or in the interior, it will be placed in some crevice in the rock. Sometimes the nest is placed in the interstices of a dilapidated old barn, or, perhaps, it is situated in a church tower. The rough and hastily-composed structure which serves for a nest is quite adapted to the contiguous wildness. The "Stannelhawk" is but too glad to avail itself of the deserted nest of any of the *Corvidæ* family; that of the Magpie (*C. pica*) or the Carrion Crow (*C. corrone*) being generally chosen. If the country be favourable, the nest is placed on some precipitous "scar," from which the Kestrel may have a view of both his enemies (should any ever assail him) and his prey.

Dovedale, in Derbyshire, is noted for the number of Kestrels which frequent and nidificate on the rock surrounding. The bird does sometimes build itself a nest: it is composed of sticks outwardly, the inner portion of twigs lined with, perhaps, a little moss, a few dead leaves, or, maybe, a little wool, often no lining at all beyond the twigs, and is erected at the commencement of April.

The eggs, which are laid from the middle of April to the end of May, are four or five in number; very beautiful in appearance. They are of a pale reddish-brown ground colour, marbled and mottled all over with a darker red. In some varieties, the ground-colour is of a white, delicately suffused with a faint

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* I notice in the *Zoologist* for April a remarkable instance of this. On p. 120 of that periodical Mr. W. A. Durnford, writing from the Lake district, says: "A kestrel rose from the embankment within a few yards of me, with a large object in its claws. . . . It dropped its prey, which on examination proved to be a full-fledged young cuckoo, dead, though still warm."

blush red, the spots being distributed so scantily as to give it a slight resemblance to a Sparrowhawk's egg. Other varieties have a zone of a darker hue encircling either ends. I have at times seen eggs of this bird of a light yellowish-brown, with spots so few and minute as to resemble a strongly-marked specimen of the Red-legged Partridge (*Perdrix rubra*). It is a well-established fact that there is generally one egg in the "clutch" much smaller than the others. This, however, may be explained by its being the last egg, and the producing organs in the female having been weakened by previous exertions. In due time the eggs are hatched, and on the appearance of the young, the energy and watchfulness displayed by the parent birds are extreme. Generally they are both to be found in the vicinity of their young, and are never absent together, one (probably the female) being continually with the young, attending to their requirements, and rigorously guarding them from all intruders; while the other parent is occupied in procuring food, of which there is always an abundant supply. Their only real enemy, and of whom they have most fear, is man. Should a person invade the precincts of their territory, and threaten their precious "citadel," the vigilant guards always give the invader due warning by uttering a shrill, piercing cry. Should the hard-hearted fellow take no heed of this, but be intent on robbing the nest of its young occupants, the parents, on the too near approach of the robber, fly up from their resting-place and sail around, out of immediate reach of danger, uttering the while a shrill, plaintive note. Sometimes either of them will make a swift descent at the intruder's head, it would seem, but, checking its course, will sweep rapidly past at a short distance overhead, making a loud rushing noise.

The eggs of this neat-looking hawk stand at the head of the schoolboy's collection. When he is in possession of one, he is satisfied, and congratulates himself on his "luck," and on hearing of any one of his schoolmates having a rival collection he immediately sets out to view it. The first question asked by him is, "Have you a Kestrel's egg?" If the answer be in the negative, he thinks absolutely nothing of the collection,—in fact, treats it with contempt, tells the owner of it about *his* Kestrel, how and where the egg was procured, and finally departs, thinking he has made an impression on his brother collector.

The Kestrels, both male and female, are very assiduous in their attention towards their offspring, keeping them sufficiently supplied with nourishment. Space will not allow of me to describe the birds, but they are so well known that it is almost unnecessary.

The "Veteran Eel."—Replying to J. J. Newton; the veteran eel, when I bought him in London, was not quite three inches long, and at his death he was eighteen inches long, so that he grew fifteen inches in twenty-two years.—*Ben Plant.*

WHAT A DIATOM IS.*

By Mons. Julien Deby,

Vice-President of the Belgian Microscopical Society.

(Translated by F. Kitton, Hon. F.R.M.S., Corresponding Member de la Société Belge de Microscopie.)

By the kind permission of M. Deby I am enabled to place before the readers of Science-Gossip a translation of a very interesting paper on the above subject, read by M. Deby before the Microscopical Society of Belgium. The attention of foreign diatomists has lately been directed to the elucidation of the life history of these remarkable organisms, in some instances with the hope of constructing a natural system of classification. Herr Pfitzer, of Bonn, and Mons. Petit, of Paris, have both published treatises on this subject.†

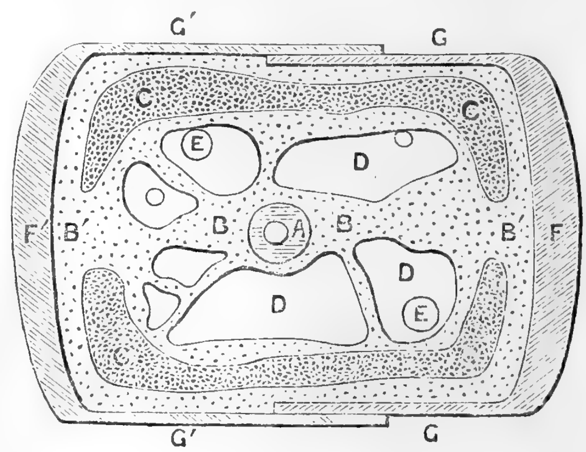

Fig. 71. Ideal section of a navicula: A, nucleus and nucleolus; B B, protoplasm; B′ B′, primordial utricle; C C, endochrome; E E, oil globules; F F′, valves; G G G′ G′, connectives; D D, central cavities.

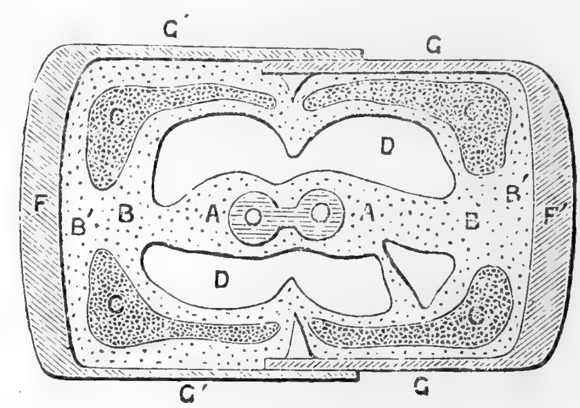

Fig. 72. Section of a diatom commencing deduplication: A, nucleus commencing to divide, with two distinct nucleoli; B, protoplasm; B′, primordial utricle; C, endochrome; D, central cavities; F F′, valves; G G′, connectives.

Mons. Deby's little treatise is devoted to a description of the living diatom and its mode of growth. Of all the forms of unicellular plants, the diatom is probably the most remarkable, not only on account of its siliceous shell, but also for its mode of reproduction.—F. K.

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* "Ce que c'est qu'un Diatomée?" par Julien Deby, Vice-Président de la Société Belge de Microscopie. Extrait des Bulletins de la Société Belge des Microscopie pour 1877.

† "Untersuchungen über Bau und Entwicklungen der Bacillariaceen," von Dr. E. Pfitzer.

"Un Essai de Classification des Diatomées," par Paul Petit.

What a Diatom is.

The little microscopic organism of which we here propose to say a few words is distinguished from the unicellular algæ, properly so called, as well as from the animals of the class Infusoria and the Rhizopods, by very distinct characteristics. They constitute one of those numerous links between that which one is apt to consider (very empirically) as forming two distinct series in nature, known as the Animal and Vegetable kingdoms; grand divisions that are only separated one from the other by the traditions of the first fathers of biological science. In their time the studies of anatomy, biology, physiology, and morphology, did not exist, and the philosophical idea, relating to life, was presented to us under a very dim veil, of which the microscope has only very recently succeeded in raising the corners.

An isolated diatom reduced to its simplest form is composed, according to our view :—

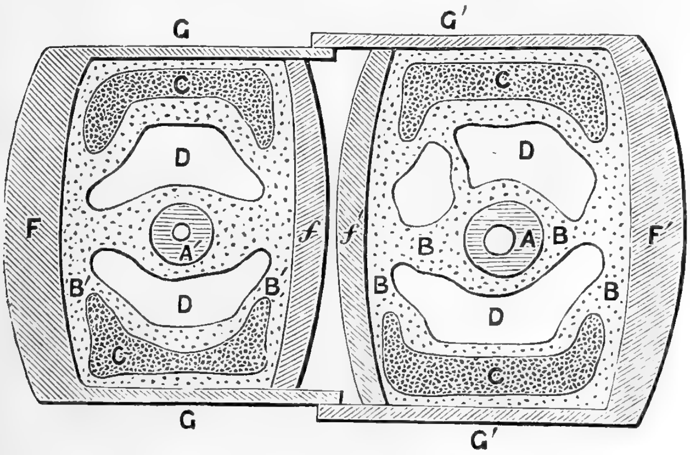

Fig. 73. Section of a diatom undergoing deduplication: A A, new nucleus and nucleoli; B B, protoplasm; B′ B′, double primordial utricles; C C, divided endochrome; D D, central cavities; F′, external mother-valve; F, internal ditto; *f f′*, new young valves; G G, connectives.

1st. A central nodule, or nucleus, more or less apparent, colourless, formed of living matter of dense protoplasm in the interior of which a nucleolus may generally be detected (fig. 71, A).

2nd. A mass of the protoplasm less dense (fig. 71, B B), surrounding the nucleus, very finely granulated, which form a certain number of prolongations, which extend up to the limits of the internal cavity of the diatom, sometimes under the form of two large bands, sometimes under that of radiating filaments, which sometimes anastomose and are of various diameters.

Under favourable circumstances an amœboid circulation, analogous to that seen in the cells of Spirogyra and in the hairs of the Urticaceæ.

3rd. A closed vesicle, more or less dense, transparent, and of the same composition and texture as that of the mass surrounding the nucleus, and that may be considered as an effusion of the branchings above mentioned. It is the primordial utricle (fig. 71, B′B′). Its thickness is considerable at the two ends of those diatoms whose axes are lengthened.

4th. A material of a golden-yellow or brown colour, known under the name of diatomine, or a mixture of chlorophyl and phycoxanthine, and which constitutes the endochrome (fig. 71, CC). This material is placed in the substance of the primordial utricle, which entirely surrounds it. It often forms (according to the species) one or more bands, continuous or interrupted, sometimes the granules are more or less rounded and scattered, or radiating.

The endochrome is subject to periodic changes of position, at certain epochs in the life of the diatom, dragged by the movements of the entire substance of the primordial utricle. The diatomine is evidently analogous to the chlorophyl of ordinary plants, of which it possesses many of the chemical and most of the spectroscopic characteristics.

5th. A central cavity (fig. 71, DD), surrounding the nucleus, and limited exteriorly by the primordial utricle, and which contains—

(*a*) A limpid, colourless fluid.

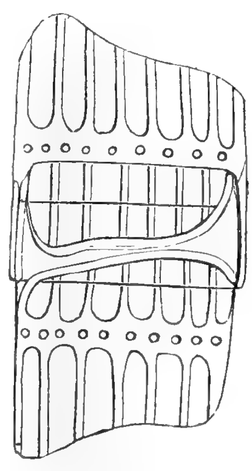

Fig. 74. Diatom (Isthmia) formed of four valves and two connectives.

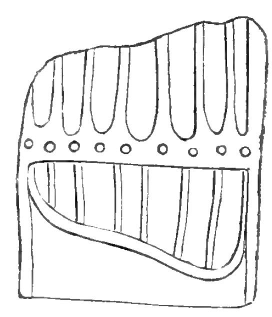

Fig. 75. The same with two valves and one connective.

(*b*) Drops of an oily nature, coloured or colourless, and highly refractive (fig. 71, EE).

(*c*) Granules of a nature not determined.

6th. An external protecting envelope formed of cellulose strongly impregnated with silica, secreted by the primordial utricle (which it invests) in a peculiar manner during the life of the diatom.

This envelope is never simple, as in ordinary cells, but is composed of two distinct opposed valves (fig. 71, FF), representing the lids of a little pill-box, and of one or two rims which adapt themselves to these valves, without, however, forming an intrinsic part of them, in a similar manner to the sides of the pill-box. These rims have received the name of *connectives** (fig. 71, GG). The valves and connectives form what is called the *frustule*.

The living diatom must be considered as an organism in which the interior is in conformity with many other unicellular organisms, but in which the protecting envelope is siliceous and formed of several

* This is the connecting zone, cingulum, or Gurtelband of various observers: we shall here use M. Deby's term.

parts, and which we meet with nowhere else in nature, and which distinctly defines these forms.

The only communication between the surrounding fluid and the interior of the diatom exists at the margins of the connectives, and probably in certain cases at their line of junction with the corresponding valves; and always in the form of linear sutures, visible only under the most powerful of our modern microscopes. We shall probably never be able to find pores or openings, properly so called, in the diatomaceous frustule, in spite of the assertions of certain microscopists: this is an illusion.

Solid matter never penetrates into the interior of the living diatom: they drink, but eat not.

(Since the above was printed, M. Deby tells me he is not quite certain that the communication between the external fluid and the interior of the diatom is at the margins, it may possibly exist, particularly in those forms possessing a median line at the terminal nodules: this will be referred to further on. —F. K.)

The movement, so curious, active, and conspicuous in certain diatoms (the principle upon which it depends is nevertheless obscure), manifests itself along the sutures, as before noticed. It is also true, that if by some cause the movement of a frustule is arrested by some immovable obstacle, the movement is reversed.

It is generally admitted, that when once a diatom becomes free, the valves increase neither in length nor breadth. The connectives, however, continue to increase by means of fresh accessions of silica around their free margins, secreted by the primordial utricle: this growth is necessary for deduplication (self-division), as we shall see further on.

The valves of diatoms are very often composed of several siliceous layers, closely superimposed, and presenting various forms, according to the genera and species, and bearing on their surface the sculpturing that ornaments them, and of which the varieties are very numerous, and the design generally very elegant. The connectives are also often furnished with similar designs, but more simple.

We will not now enter into the question as to the intimate structure of the markings on the surface of the valves of the diatoms, some of which defy our most powerful objectives. The simplest form of diatom frustule is composed of—

1st. A superior valve (fig. 71, F′).

2nd. An inferior valve, sometimes differing from the superior (fig. 71, F).

3rd. A connective adapted to the superior valve (fig. 71, G′G′).

4th. Generally a connective adapted to the inferior valve (fig. 71, GG).

One of these connectives slides within the other, like the draws of a telescope, and can be separated.

We must consider all diatoms as organisms, formed of two distinct materials, one of which is *living*, viz. the protoplasm, the other non-living. The first alone is able to produce the second; that is to say, the endochrome and the oily corpuscles in the interior; and exteriorly, the cellulo-siliceous frustule, with the various supplementary appendages which we meet with under the form of stipes, tubes, mucous cushions, gelatinous envelopes, &c. The endochrome of diatoms, like the pigment found in animals, or the chlorophyl in plants, has not the power of secreting the secondary products; being themselves formed materials, their *rôle* is in connection with the functions of respiration.

Deduplication (self-division).—If a diatom is examined when the connective is turned towards the observer, we perceive that it increases longitudinally by accretions at the margins of the connectives; at the same time, at the extremities of the frustule, a fold may be seen in the primordial utricle. (This fold is not at the extremity of the frustule, but at the extremity of the connective of the inferior valve.—F.K.) This fold gradually approaches the central cavity, and is prolonged by degrees until it reaches the nucleus, which it divides in two, if it has not done so before. The opposing edges of the fold continue to approach each other, and at last unite, and the point of contact is obliterated at the place where we originally saw the nucleus, and which is completely separated (fig. 72). At this time there exist in the interior of the diatom two contiguous primordial utricles, each possessing a nucleus, which quickly becomes central. In each nucleus may be seen a nucleolus. As soon as this phenomenon is accomplished, both external surfaces of the new utricles commence secreting a siliceous covering, which quickly thickens, and is covered with the design proper to the species, and speedily assumes the form and aspect of the old valves (fig. 73). The new interior valves occupy a central position in the frustule, and are face to face.

We have seen a diatom formed of four valves, when the two old external valves and the two new internal ones were close together; the new valves were supported all round the circumference by the connectives of the original valves.

Soon after—sometimes even before—the parting of the primordial utricle, we perceive that the connectives are considerably enlarged, and at the same time the interior slides in the interior, and by this means separating the two valves to a considerable extent; thus augmenting the dimensions of the internal cavity of the frustule. The connectives of the young valves are not developed until later on,—sometimes before their liberation, and sometimes after, according to the genera and species of the diatom.

Later on, the sliding of the connectives in the species whose frustules live isolated, attains its maximum; the narrowest liberating itself entirely from that which had served it as a sheath.

From what we have just said, we may meet with

the same species of diatom, according to its state of development,—individuals possessing

(1) Two valves, a connective, and a nucleus (fig. 75). (2) Two valves, two connectives, and a nucleus (fig. 71).	Simple state.
(3) Two valves, two connectives, and two nuclei (fig. 71). (4) Four valves, two connectives, and two nuclei (figs. 73 and 74). (5) Four valves, four connectives, and two nuclei.	States of deduplication more or less advanced.

Sometimes the external connective is fragile, and is detached spontaneously. This is a fact that must be taken into account.

It is also well to note that the protoplasm of the primordial utricle generally moves to the interior of the siliceous envelope, first at the commencement of the deduplication, and again after the termination of that phenomenon, dragging with it the endochrome, and that these movements of the colouring matter vary in character according to the families and genera of the diatoms.

When a diatom is divided into two parts by deduplication, the endochrome is also separated into two, in order that it may be equally divided between the two utricles.

Every frustule, as we have seen, consists of an old valve (fig. 71, F′, fig. 72, F′) originating from the primitive frustule, and a new valve of later formation, and whose connective when developed will slide in the connective of the old valve. It follows from this, that in the great majority of the genera of diatoms, when the connective is of the exact breadth of the valves, or even inferior to them in diameter, all deduplication must lead to a diminution of the dimension of the new frustule equivalent to double the thickness of a connective. The thickness of the latter being known, we are able *à priori* to determine the size any descendant of a frustule will have after a determinate number of deduplications. The act of deduplication, considered only in connection with the primordial utricle, is analogous to that which takes place in the majority of vegetable cells, and we may therefore consider every series of diatoms proceeding from a primitive mother-cell as forming in reality only a single whole—a single plant, if you will.

In those species which form permanent series (filaments) where the frustules produced by deduplication never separate one from another, this is very obvious, but those species in which they become new frustules become detached, and live free or isolated; only the eye of the philosopher can recognize the analogy.

(*To be continued.*)

THE NATTERJACK TOAD.—The Natterjack Toad may be found on the west coast, near New Brighton, Cheshire, amongst the sand-hills between Midston and Liscard. The eggs of this interesting and uncommon toad appear, in their early stage, like a string of beautiful pearls.

HOW TO MAKE AND COLOUR CASTS OF FISHES.

By J. E. TAYLOR, F.L.S., F.G.S., ETC.

OF all the natural history objects intended to be preserved, perhaps none have been hitherto more difficult than fishes. Either they were preserved in spirits in glass bottles, in which case they were scarcely visible in the sherry-coloured liquid, or they have appeared in the stuffed state as the most grotesque of caricatures. Nothing can be more strongly contrasted than the supple and graceful forms of fishes in their native element, and the stiff and angular specimens in our museums which have been "stuffed." Of all skins, those of fishes are least amenable to the animal preserver. They stiffen and set sooner than any other, and he is obliged often to turn them out, not as he would like, but as well as he can.

Some years ago, the really fine specimens of coloured casts of fishes placed in the South Kensington Museum, under the direction of Mr. F. Buckland, drew the attention of all lovers of fishes to the new method of preparing specimens. Those exhibited by Mr. Buckland are still so like life, both in colour, marking, and the graceful supple outlines characteristic of fishes, that the observer is some time before he is assured they are not *real* fishes he is looking at. Every scale, fin, and ray is in its place; and a brighter and more attractive set of natural history objects it would be impossible to arrange. It should be understood, however, that these are merely casts, for which the fishes themselves have supplied the moulds. We are not aware that Mr. Buckland, or any one else, has ever published a description of how these casts are prepared. Some time ago, when desirous of learning the secret, we made all the search we could, but failed to find anything beyond an allusion. Since then we have experimented and blundered until we have attained some degree of success, and now have the pleasure of laying before our readers the benefit of our experience.

Let us observe that the student will find fish-casting both a pleasant and profitable recreation from sterner studies. It is artistic enough to require the good taste of the most educated, and being as cleanly as any cooking operation, there is no reason why ladies should not engage in the work as well as men. Moreover, it is cheap, and a little practice and skill will soon enable any one to take natural casts of fishes, and to colour them well enough to be far better natural history ornaments for halls and rooms than the cases of stuffed birds we often see hung in such places.

The first thing is to get some well-ground plaster-of-Paris. We have found that the second quality is better for fish-casting than the first, as the latter sets too quickly. The fish whose cast is intended to be taken should be as fresh as possible. Fish stiffen

after being taken out of the water, and become too limp afterwards. If it is not convenient to take a cast of fishes immediately, then, if fresh-water fish, they should be packed in plenty of damp moss, and if sea fish, in soft seaweed, and kept in the dark. Before casting, fish should be washed by letting the water from the tap flow over them a few moments. They must not be rubbed with a cloth or otherwise, as the scales are apt to come off. The fish should then be laid on a smooth

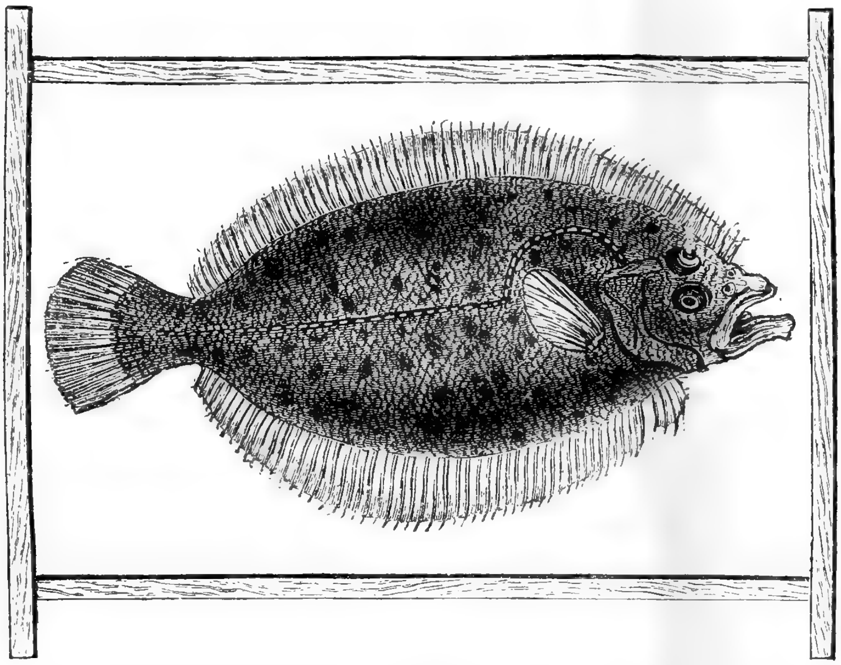

Fig. 76. Brill, laid on table and enclosed in thin wooden bars ready for plaster of Paris being poured over.

Fig. 77. Thornback, laid in position for casting.

table or planed board, perhaps on a newspaper is best, as the lime will not then adhere to the wood. It must be laid out according as the taste of the operator may suggest, so that the cast of it may look as like life as possible. Four bars of wood should then be arranged, as in fig. 76, so as to include the fish as in a frame. When the plaster-of-Paris is poured over the fish this loose framework will prevent the lime from running about. The plaster-of-Paris should then be mixed, the operator judging of the quantity required. At first he will undoubtedly mix too much or too little, but a very short experience corrects this. It is best to mix the powdered plaster under a water-tap, and to have the water gently trickling whilst the lime is being stirred with a wooden spoon. When it has attained the consistency of thick cream, shut off the water, and with all possible despatch pour the mixture over the fish, and the space within the frame as well. The fish need not be covered to a thickness of more than half an inch. The fish, embedded in its plaster covering, should then be left where it is for a few hours. By this time the lime will have thoroughly set, and the entire mass can be easily turned over, for the newspaper has prevented the lime adhering to the boards. The paper is then torn off, and the fish carefully extracted. This requires much care; and perhaps the operator will have to cut or bevel away the plaster which has so run under and about it as to prevent its easy extraction. But a little patience and experience will suggest to the student how to proceed in such cases.

The fish having been taken out, there remains its perfect mould, showing every scale and fin. The mould should now be put away in a dry and warm place for several days; indeed, until it gets perfectly dry. It may then be brought out on the working-table, and propped up with paper or anything else,

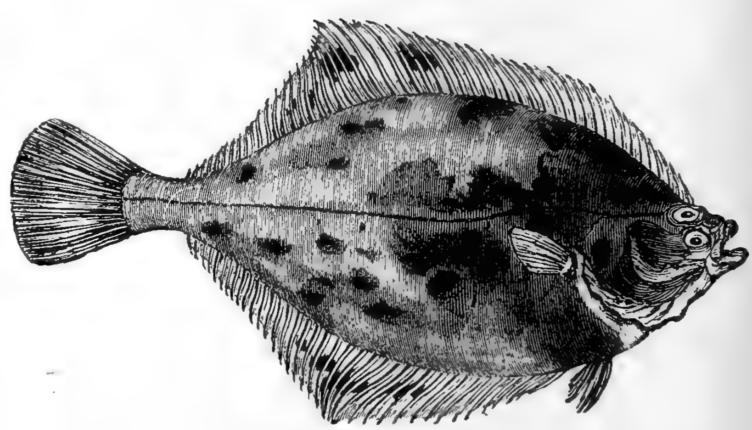

Fig. 78. The Flounder, laid in easiest position for casting.

with the concavity left by the fish uppermost. This hollow should then be well anointed with a strong and tolerably thick solution of soft soap. We have found that it answered better than anything else. The soap should be gently and delicately rubbed over the interior of the mould with a large and dense camel's-hair brush, so as not to rub off any of the sharpness of the impressions left by the scales, &c. The flat surface of the outside of the mould, where the liquid plaster flowed within the space of the frame of wooden bars, should also be equally well anointed with the interior.

The mould having been made as firm and steady as possible, the operator now mixes another batch of plaster-of-Paris. At first it is best to mix too much rather than too little, for if there is too much it need not be all used, but if there is too little the cast will set whilst more is being mixed, and the entire labour may thus be lost. The plaster should be of about the same consistency as when it was used for making the mould. It is poured into the latter gently and evenly, until it is completely filled, and the process is continued over the square-bar space, until it covers the latter, say an inch in thickness. By means of a trowel, or any other tool, the plaster is smoothed down to an equal level. With a knife, the overflowing plaster should then be pared off before it sets hard, so as to be flush with the square sides of the mould. Both mould and cast must be put away for a day or two, after which the task of taking off the mould may be commenced.

Perhaps, in setting, the heat of the larger quantity of plaster which has been employed in making the cast will have cracked the mould. If so, it is advantageous, for each mould can only be used once; if the fish operated on be a rare one, it is best, therefore, to take several moulds of it. Of course, a good deal depends on the shape of the fish as to how it shall be extracted from the mould. In the flat-fishes, as the sole, turbot, brill, halibut, flounder, and skates, there is little difficulty. By inserting the edge of a knife between the mould and the cast, the former will come off. Most fishes are laid on their sides when the mould is being made, as, for instance, perch, bream, roach, pike, cod, mackerel, salmon, &c.; but such triangular-bodied fish as the gurnard, cottus, &c., had best be placed with the belly side downwards, and their large pectoral fins spread out. Sometimes it will be necessary to break off the mould in pieces, and much care and patience will then be required. But experience in manipulation comes after a few trials, and it is astonishing how soon we learn to proceed under all circumstances.

When the mould has at length been stripped off, the operator has the perfect cast of the fish as first laid down. Every scale and fin is present, whilst the space between the movable wooden bars (which we recommended should be covered over on the mould) is now a square background, from which the cast of the fish stands forth in high relief. A littile trimming and truncating of the edges makes it perfect. Any cavities left either in the cast or the base to which it is attached, may now be filled up and smoothed down. Sometimes the tips of the fins break off when peeling away the mould. In that case the student must repair them as best he can, by adding a little plaster, and carving it down when dry. The feelers or barbules of such fish as Cod, Whiting, &c., may best be imitated by fixing a little copper wire into the under jaw of the cast, and then covering it with a mixture of gum-water and plaster of Paris, laid on with a small camel-hair brush. The loose, leg-like rays of the pectoral fins of the Gurnard may easily be imitated in a similar way. We always like to see the dorsal, caudal, pectoral, and other fins laid out, so that the

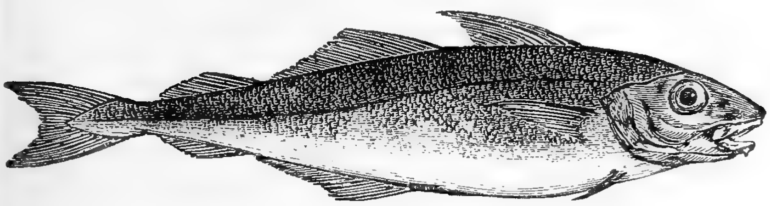

Fig. 79. Position of Pollack Whiting for casting.

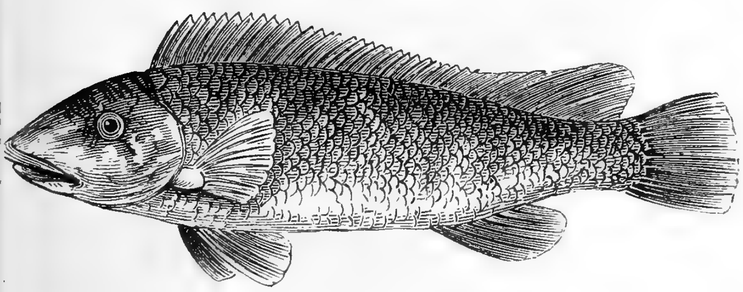

Fig. 80. Ballan Wrasse, with fins spread out, ready for casting.

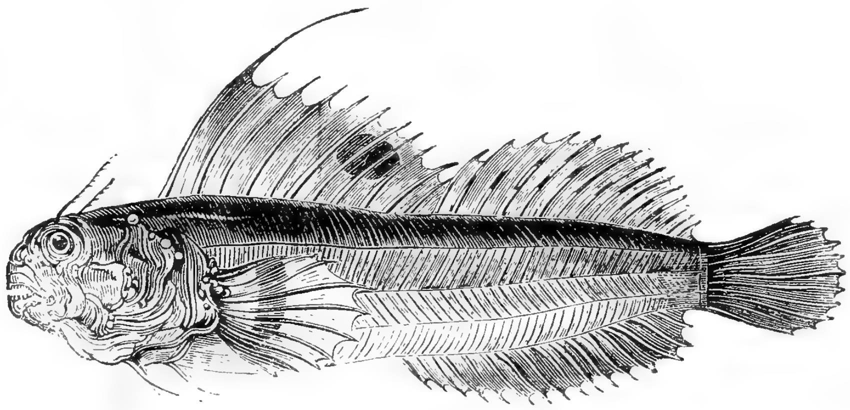

Fig. 81. Butterfly Blenny, showing expanded dorsal fin.

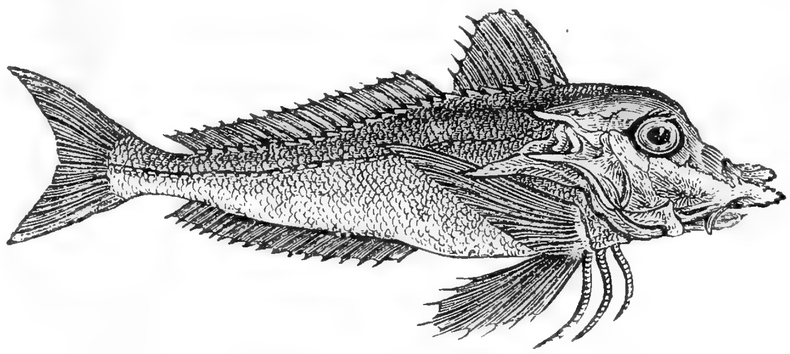

Fig. 82. The Piper Gurnard (*Trigla lyra*), showing separate rays of pectoral fins.

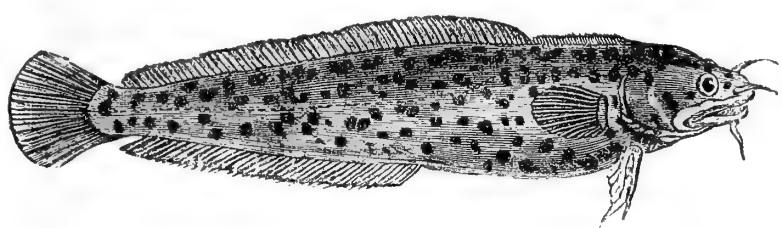

Fig. 83. Three-bearded Rockling, showing barbels on mouth, which have to be imitated with wire.

cast shows them as when the fish is swimming (see fig. 81).

By means of a knife it will be easy to undercut the back of the expanded fins, or to loosen and cause to stand out any part of the cast that may require it. The entire cast of plaster, say to take the case of a five-pound Codfish or Salmon, will not cost more than sixpence. What is to be noted is, that fish are as fit for the table, after having had their likenesses taken as they were before!

And now comes the colouring of the cast—a more difficult, because a more artistic operation, but not half so difficult as would be at first supposed. Although the natural colours of our native fishes are given in such works as those of Yarrell, yet it is best for the student to note the distribution and tone of the colours before he commences to take a mould of his fish. This he can readily do by drawing a rough pencil outline of the fish, and then marking on it the colour, and what depth and tone. We have found these outline sketches quite enough, with the help of Yarrell and a good memory, to colour a cast twelve months after making it. Moreover, it forces the student to be particular and careful, and he is the gainer therefrom. The colours of fishes are apt to be taken from their appearance on fish-stalls. No mistake could be greater. If we are obliged to eat fishes, there is no reason why we should libel them as well! The black-leaded tints and shades of a herring which has been lying a couple of days on a stall, are quite different from the prismatic colours it had when first taken out of the water. We prefer colouring them according to nature, rather than after the dictation of the fishmonger; and as the colours are brighter, the effect is more artistic.

The proper colours of the eyes, fins, &c., should be first attended to. We always use water-colours, and prefer them to oils. The water-colours should be mixed with a little ox-gall to make them flow better. A wetted flannel by one's side enables us at once to rub out an error. Sufficient colour to spread over the fish must be mixed at first, and a bushy camel-hair pencil employed to distribute the colour. Such spots as those on the Homelyn Ray are easily made by rubbing the ground colour lighter, and then surrounding each spot with a ring of darker pigment. You lay on the colours and shades of the back of the fish in successive tones, until you get them deep enough. If possible have a fresh fish before you when colouring the cast, so as to get the tints, shades, spots, and other markings quite correctly. Notice the difference (often the only external means of identifying them) between the colours of the male and female fishes, as in the Mackerel for instance. The delicate prismatic tints of the silvery-white belly are the most difficult to imitate; and the student gives up in despair the attempt to reproduce the more than silvery glint of the lower parts of the body. Still, a few endeavours to rub in alternately streaks of lake, blue, and yellow succeed in forming a not bad imitation. We have found that a few drops of common writing-ink, diffused in a quantity of water, enabled us to reproduce the silvery and steely glint of the belly better than anything else. The student should always have plenty of the fragments of the broken mould by him, to try his colours upon before transferring them to his cast.

At last the cast is coloured satisfactorily. It must now be laid by for a day or two, until the water from the colours has been given out. Then it should be sized with a thickish solution of the best and clearest glue, and put away again for some time. At length it is brought out for the last time, and painted with a thickish coat of transparent copal or coach-varnish. This gives to the coloured cast a wonderfully moist and fish-like look, and no mould or other fungus ever attacks this varnish, as it does glue. The background may now be painted a deep Wedgwood blue, so as to represent water, and at the same time throw forth the coloured fish into strong and prominent relief.

If the coloured cast is intended to ornament a room, the background must be set in a wooden framework, with glass sides, top, bottom, and front (as in ordinary stuffed-animal cases): these protect the specimens from dust, and the operator may thus adorn his hall or study with exact and artistic models. It will have been seen that there is nothing whatever, either of dirt or labour, to prevent ladies from engaging in what we guarantee will prove to them a most pleasant and profitable recreation.

For such small fishes as sprats, minnows, whitebait, &c., it will be advisable to make the moulds of the same materials as those composing printers' rollers; that is, half in weight of common glue and common treacle. These are boiled together until a uniform liquid is produced, which may then be kept fluid by placing the pot containing it in a pan of boiling water, just as carpenters keep their glue-kettles. This hot mixture is then poured over such a picturesque little heap of whitebait or sprats as would make, say, a decent handful. Of course it takes the impression of the mass, and of every individual fish it covers. The mould is then to be turned the other side up, and the fishes carefully picked out one by one. At length the last is picked out, and a perfect mould of the heap remains. This must be cast in plaster of Paris, where no difficulty remains in undercutting (as would be if the mould had been made of plaster), for the soft gelatinous mould can be picked out with a penknife, and the small fishes thus form a loose, pretty heap. They must then be coloured when ready, and the background tinted blue, as above suggested.

For casting large fish more than one pair of hands may be required, as the plaster soon sets when mixed. Only two qualities are required to be successful in fish-casting, — patience and perseverance. If those who attempt to carry out the experiment possess them, they will succeed; if they have them not, they may,

but we will not answer for it. It would be possible, we should imagine, for students to take several moulds of a rare fish, and to exchange these with one another, so as to get together a good collection of British fishes.

A WET METHOD OF PREPARING OBJECTS FOR MICROSCOPICAL MOUNTING.

IN the preparation of objects for permanent mounting, the *bête noir* of the microscopist is the too well-known and ever-recurring air-bubble. Books on microscopy seem to recommend but one way of mounting vegetable or animal tissues in the usual preservatives, Canada balsam or dammar. And this method is certainly, on the face of it, rather a peculiar one. It is that of drying the object and then steeping it for some time in turpentine. In fact, in order to get rid of the small quantity of air contained in some of the vessels, the whole of the object is filled with air, and then this extra quantity of air (unnecessarily put in) has to be quietly soaked out again, or is forcibly dragged out by the air-pump. This process of filling up with air and then extracting it again occupies no small amount of time, but, in some cases, no such expenditure of misapplied patience, even combined with the persuasions of the air-pump, will entirely extract the air.

Now, objects such as insects, sections of plants and animals, may be prepared for mounting entirely by a wet process, and that with speed and certainty.

This wet method I have used for several years, and I believed at one time that most of those interested in microscopical work must have known of it. But of late, conversation with microscopical friends has led me to imagine that it is little, if at all, known to the mass of workers with the microscope. I cannot suppose that the plan is original, though I have not yet met with any one else that has worked at it.

The only piece of apparatus required is a single test-tube. Into this the sections or parts of plants or animals are placed, and the tube about half-filled with distilled water that has been made acid with a few drops of nitric acid. The liquid is now heated almost to the boiling point for from five to fifteen minutes. The acidulated water is then poured off, and the tube filled with hot distilled water and gently shaken once or twice. The water is now completely poured off and replaced by methylated spirit; this is heated almost to its boiling point for about five minutes. It is then poured off, and the tube about a quarter filled with ether, and the contents heated gently by immersing the end of the tube in a cup of hot water for half a minute. Ether, being highly inflammable, should not be heated by, nor brought near to, a light. Now pour off the ether and quickly drop in a quantity of turpentine that will a little more than cover the objects. The whole operation is now finished, and every particle of air and water originally in the object has been replaced by turpentine. The objects are now ready for mounting in Canada balsam or dammar.

There need be no waste of materials, since the methylated spirit and the ether may each be poured into separate residue bottles, and, after a quantity has been collected, be re-distilled without any loss worth mentioning.

In this method we first fill the object with its natural permeator, water, and then replace this with methylated spirit. This latter, being of greater tenuity, enters into some of the minuter vessels which the water has still left only filled with air.

Ether is next made to take the place of the spirit, and this, from its marvellous tenuity, rapidly fills any vessels that the spirit even had perchance failed to fill. Thus a road, as it were, having been made for fluids, turpentine easily and rapidly spreads throughout the object. I know that there is a process somewhat similar in which oil of cloves is used. But oil of cloves has not the same extreme tenuity as ether, and so does not permeate tissues anything like so thoroughly as ether does. It is also rather expensive, and does not readily admit of being used over and over again.

The advantages of the wet process are its economy of materials, its leaving the object almost unaltered in appearance, its cleanliness, and, above all, its extreme rapidity and certainty.

Only a single test-tube is required in which a dozen or two of objects may be placed at one time.

The re-agents, with the exception of the water and acid, which are not worth saving, may be used again and again.

In drying an object, since all the water which made up so much of its bulk is driven off, its shape is often greatly altered, its original form being only partially restored by the after processes. By the wet method, the cells are never empty of liquid; of course, both spirits and ether shrink objects to some extent, but the turpentine and balsam usually all but entirely restore the original form. As to the time taken, the drying method often requires weeks; the wet method seldom needs an hour. There are some objects which I have never seen entirely freed from air by the drying process, followed by prolonged soaking in turpentine and the use of the air-pump; but I have not yet seen an object that the wet process would not rapidly free from air. It is possible by this method to cut three or four fresh sections from a tree, permanently mount them in Canada balsam or dammar without a single bubble of air, ring them with coloured cement, and label them within the hour.

The use of nitric acid is not a necessity, but it quickens the process. Sometimes it is better to use in its stead a little potash, only then the objects

should be afterwards well washed with distilled water before adding spirit. Objects, such as some parts of insects, which are not transparent, need, as usual previous maceration in potash solution. Benzole would, doubtless, do equally well as ether, but I have hitherto only used the latter.

This method is not applicable to all objects; those containing, like the water-lily, an excessive amount of water shrink too much, and must be mounted in fluids. If it be desired to stain the specimens, this is best done by adding the dye to the methylated spirit.

I do not claim this as a new method, but, as I know many workers who have not heard of it, I thought that such might care to try so expeditious, easy, and certain a method. A. W. STOKES.

Laboratory, Guy's Hospital, S.E.

MICROSCOPY.

A NEW IMMERSION OBJECT-GLASS.—At the last Meeting of the Royal Microscopical Society, Mr. J. H. Stephenson read a paper on this subject, in which he described a new immersion object-glass which he had designed to obviate the difficulty often experienced in the accurate arrangement of the adjusting collars of high-angled objectives. This glass had a focal distance of 1-9, and a balsam angle of 113°. It was stated to bear very deep eye-pieces, and to have a very flat field. The great difficulty of obtaining an "immersion" fluid having the same refracting index as crown glass has at length been overcome by the adoption of oil of cedar-wood, diluted with 1·5 parts of oil of fennel-seed.

MARINE AMŒBA.—Dr. Entz states that species of *Amœba* have been found in sea as well as fresh water. At Cuxhaven he found two species, *A. limax* and *A. radiosa*, very abundantly. He regards *A. marina* as probably identical with *A. radiosa*, and possibly also Haeckel's *Protamœba polypodia*.

"A NEW FIELD FOR THE MICROSCOPE."—Under this title, Mr. W. Saville Kent, F.L.S., has a profusely illustrated article in the April number of the *Popular Science Review*. It describes the life-history of a new group of flagellate monads, which require a very high power to determine; and the writer very properly remarks that the new and high class magnifying powers, often only used to resolve dots or striæ on a diatom, or to solve a question of angular aperture, might very usefully be employed in following out the details of the life-histories of these most interesting organisms. The article is of a most interesting character throughout.

FOSSIL DIATOMACEÆ, &c.—Some months ago I received a piece of cement-stone from the island of Für, coast of Denmark. It is a poor variety of limestone, and if a portion be dissolved in acid, the residue, when examined, is seen to consist of interesting marine forms of diatomaceæ, chiefly species of *Triceratium*, I believe, possibly *Amphitetras*, also a few *Coscinodisci*, and a great many small *Polycystinæ*, and *Actinisceæ*. Is this stone generally known to microscopists? I have not been able to get any information concerning it. Dr. Carpenter mentions *Triceratium* occurring in a fossil state only in the Bermuda and Richmond earth.—*Will. Paterson.*

DIATOMACEOUS DEPOSITS NEAR RICHMOND.—I send herewith specimens of prepared diatoms, from parts of the Richmond and Petersburg fields, lately discovered by me. The Petersburg slide shows several varieties of *Coscinodiscus*, *Actinocyclus*, *Actinoptychus*, *Pleurosigma*, and *Euphodiscus*. There are many specimens of *Triceratium* on it, the most characteristic being perhaps *T. spinosum; B. rhombus* is also plentiful. The transparent character of most of these diatoms, and the fact of finding many forms in this deposit, common in fresh water, would indicate that this part of our diatomaceous stratum may have been laid down near the mouth of some great river of later tertiary times. The Richmond slide shows most of the rare forms of that deposit in greater abundance than I have ever seen before, while it contains comparatively few of the *Orthosira marina*, which makes the larger portion of the deposit from other parts of the Richmond field. A *Navicula* with curious beading on the connecting zone, and very fine striation, is shown in tolerable abundance, from four to six or more on each slide. This particular form, Prof. H. L. Smith thinks new, and it is a very good test for a 1-8th or 1-10th objective, which should resolve it into squares with oblique light. The areolations on the larger *Coscinodisci* can be seen with a good simple triplet, while to show the markings on some of the *Rhizosolenia* is a test for the very best high powers. The two Richmond *Pleurosigmas Virginica* and *angulatum*, are also plentiful, and as the striation on these is uniform, so far as my observation goes, this slide makes one of the best general tests to be had, furnishing an accurate measure for the comparison of objectives, of nature's own ruling, perhaps superior to any artificial lines made.—*C. L. Peticolas, Richd., Va.*

LIVING MICROSCOPIC ORGANISMS.—It is with great pleasure that we draw the attention of our microscopical readers to the agency started by Mr. Thomas Bolton, whose advertisement has several times appeared in our columns. For a trifling sum, Mr. Bolton sends forth living organisms of *Spongilla*, *Hydra*, *Actino-sphærium*, &c. It is some time since we had more sincere pleasure in recommending what our microscopical readers will agree with us in affirming is a genuine and praiseworthy undertaking.

AN APOLOGY FOR DIATOMANIACS.—Professor J. E. Smith, in an address delivered before the

Dunkirk U.S. Microscopical Society (published in the *American Journal of Microscopy* for March), makes the following remarks :—"We often hear the diatomists spoken of in terms of contempt. They are now regarded by the histologist as a class of observers who use the microscope as a mere plaything, and the fact that diatomists are not altogether agreed as to the structure of these favourite shells is often used as an argument to show the folly of studying diatomaceæ at all. All this, my friends, is sheer sophistry. The study of the diatomaceæ is as legitimate as that of any other branch of the science of Biology, and the labours of the diatomists have not been for nought: it is to them, and to their constant demands on the optician, that we are indebted for the wonderful improvements which have been made in object-glasses; and I am bold enough to tell you that skilful diatomists can tell you as much about the structure of a diatom as can the pathologist equally skilled inform you as to the structure of a blood-corpuscle. But to the student, to those who desire to *prepare* themselves for advanced work, the study of the diatomaceæ cannot be neglected. No line of practice has yet been discovered that will teach the student the use and management of his tools that can at all compete with the superior claims of these minute organisms. It is said that 'adversity tries us, and shows up our best qualities.' The little shells, too, will try the would-be manipulator, and, like the country judge, show up his worst qualities."

ZOOLOGY.

The Literary and Philosophical Society of Liverpool.—The "Proceedings" of this well-known society always contain welcome matter. The thirty-first volume is now to hand, containing a masterly address by Mr. A. J. Mott on Haeckel's "History of Creation," in which the writer opposes the evolutionistic view. Mr. J. A. Picton, a well-known antiquary, and president, publishes his presidential address on "The Present State of Linguistic Science"; Mr. Edward Davies has an essay concerning "Popular Errors about Poisons"; Mr. George Morton one on "The Introduction of Geological Maps"; Mr. Alfred Morgan another on "The Origin and Progress of the United States Geological and Geographical Survey of the Territories"; the Rev. H. H. Higgins one on "The Liverpool Museum Reports," &c. Besides the above there are numerous papers on purely scholastic and literary matters. A handsome and bulky volume is thus compiled.

Natural History Societies.—We have received the eighth annual report of the Wellington College Natural History Society, and are pleased to find indications of increased vigour on the part of the members. It is an excellent thing to find natural science cultivated for its own sake by the students of our public schools, and still more so to find, as this and other reports give evidence of, that the students are doing actual field work, and thus contributing to the solid stores of scientific information. The present report shows that in addition to various papers read and excursions made, the botany and ornithology, &c., of the district has been worked, collections and observations made, and lists published of the results. We wish the Society continued success in its ardent and praiseworthy labours. The Huddersfield Naturalists' Society, established in 1847, for the promotion of knowledge in various branches of Natural History, have issued their list of members, &c.; each member has the special study to which he is attached placed after his name. Curators are appointed for the departments of conchology, botany, entomology, zoology. The report of the Chichester and West Sussex Natural History and Microscopical Society, just issued, shows that the Society is in a healthy condition. At no previous period has the number of working members been so great as at present. Eighteen papers on various natural-history subjects were read during the session just terminated.

Toad and Goldfish.—The incident which Mr. Horace Pearse relates (p. 94) of his Goldfish being so tenaciously embraced by a toad, is easily explained by a knowledge of the habits of toads and frogs. At this season of the year, or a little earlier, when their generative instinct is intensely strong, the male clasps the body of the female with his fore-legs in order to fecundate the ova as they are emitted. To enable him to do this the more firmly, a small digit or warty protuberance is temporarily developed in the thumbs, and the hold is thus rendered so secure that it requires considerable force to effect a separation. It was in obedience to this strong instinctive impulse that the toad in question grasped the goldfish "firmly by the head in his front legs." That male frogs should attach themselves to the surface even of large fishes is not an unfrequent occurrence, and old Izaak Walton referring to a fact of this kind, attributes it (erroneously of course) to a "great antipathy betwixt the pike and some frogs."—*Ed. Hart Vinen, M.D.*

The "Harvestmen."—Mr. J. H. Cary, in his interesting observations on the Harvestmen or Phalangiidæ, desires to have further information on the subject. The monograph on the British species by Mr. R. H. Meade, F.R.C.S., in the *Annals and Magazine of Natural History* for June, 1855, is excellent, and I think the only one in the English language. For the anatomy of *Phalangium Opilio* there is a paper by Mr. A. Tulk in the same magazine for October, 1843. Mr. Cary has fallen into some errors regarding the true spiders. He seems to imply that the palpi are the reproductive organs of the male spider; which is hardly the fact, for the male has a complete generative system in the abdomen, and the

palpi are only conveyers of the seminal fluid. Also, he says, there are spiders without spinnerets, which is very doubtful: there is but one species, *Liphistius desultor* (Schrödte), found at Penang, of which the typical specimen had no spinners; but the Rev. O. P. Cambridge, M.A., has since described a specimen in the British Museum, which is in all respects *L. desultor* except having the spinners. The "Harvestmen" that Mr. Cary describes, are, I think, from his description of the falces, *Phalangium cornutum* (Linn.). He has probably mistaken the stigmata on the fore part of the cephalothorax (as Mr. Tulk did) for another pair of eyes, as our British species have but two, placed on the apex of the cephalothorax. The male and female of *P. cornutum* are often mistaken for different species, because of the great difference between the falces. Regarding the moulting of the Phalangiidæ, I have never heard that they cast their skin as spiders do, but maybe Mr. Cary has made some observations that would prove that that is the case. The abdomen of true spiders is not segmented as in the Phalangiidæ.—*Tom Workman, Belfast.*

Practical Darwinism.—Dr. E. Coues, of the United States Geographical Survey, states that a breed of *solid-hoofed* pigs has apparently been established in Texas. The terminal phalanges of the toes are united to form a single broad phalanx. Above this, however, the other two phalanges of each of the two principal digits remain perfectly distinct. The hoof is perfectly solid, and on its sole there is a broad angular elevation of horny substance, very like the "frog" of the horse's hoof. The breed is so firmly established that no tendency to revert to the original form is noticeable. It is also stated that in the cross of a solid-hoofed boar with a sow of the ordinary type, a majority of the litter have the peculiarity of the male as regards their feet.

The Colours of Caterpillars.—At a recent meeting of the Entomological Society of London, Sir John Lubbock, in accepting the opinion laid down by Darwin, that dull-coloured, green, and smooth-skinned caterpillars are eaten by birds, whilst spiny, hairy, and brightly-coloured species are rejected, stated, that by the statistical method it was proved that no hairy caterpillars are ever green; whilst, on the other hand, a large majority of black and brightly coloured species are hairy or otherwise protected.

The Ceratodus.—Mr. E. P. Ramsay has recently written to *Nature*, to say that a fine series of eleven *Ceratodus* have been kept alive at Maryborough, Queensland. This rare and geologically ancient fish can only be obtained at certain seasons, and in certain parts of the rivers Mary and Burnet. The *Osteoglossum* is frequently and erroneously confounded with it.

BOTANY.

The London Flora.—The doubts as to the actual occurrence near London of *Crepis paludosa*, expressed by the author of a review on the new London Flora, in the *Journal of Botany*, are well founded. It is not that species, but *Crepis setosa*, which occurs in the locality indicated. The entry in my note-book with regard to it was corrected in one place and not in the other; hence the mistake. *Carex curta*, hedge at Totteridge, is right in the Index; while the entry in the Localities should have been *Carex divulsa* (lane), *curta* (hedge, &c.). Both species are not unfrequent in hollow lanes both of Middlesex and Herts. *Bromus racemosus:* the habitat, &c., given of this plant refers to *B. giganteus*. The entry should have been "meadows and pastures: flats by the Thames in Kent." Many English authorities consider this species a variety of *commutatus;* smoother and with panicles more compact. But the distinguishing characteristics ascribed to them by the French botanists are, outer glumellas entire, *B. pratensis* (*i.e. commutatus*), outer glumellas notched (*échanchées*), *B. racemosus.* Through inadvertence, interlineations in the MSS., and inexperience in the correction of proofs of the kind in question, errors and misprints were extremely probable, and "these are of them." Others, the omission of "*Bromus mollis*, common, everywhere," for example, I leave to the critics to find out and dilate upon, wishing them every gratification in the task.—*Eyre de Crespigny, M.D.* P.S.—*Nasturtium sylvestre* in the Index should have been *N. terrestre*, and *vice versâ*, as may be guessed from the context.

Rapid Growth of Vallisneria.—Mr. A. W. Bennett says: "The first flower-bud of *Vallisneria spiralis* made its appearance in my aquarium last year on July 1st, the pedicel being at three p.m. about 1·5 inch long. On the 3rd, at four p.m., the base of the bud just touched the surface of the water, and the pedicel was about 7 inches long. At one p.m., on the 7th (an interval of about ninety-three hours), it had reached the astonishing length of 43 inches."

Early Flowering of Borage.—It may be interesting to your readers to know that the common Borage (*Borrago officinalis*) is in full flower as early in the year as this. I do not know of any instance of this plant being seen so early in flower, *June* being usually its earliest time for appearing. The specimens in question were gathered by my brother, Mr. F. H. Worsley Benison, of Chepstow, at Beechley, near that town, on March 27th, and sent to me. It was found in abundance on a bank immediately overhanging the Severn.—*H. W. S. Worsley Benison.*

The Ferns of North America. — Messrs. Hardwicke & Bogue announce their intention to issue in parts (by arrangement with the American publishers), Professor Eaton's "Ferns of North America."

"FLOWERS: THEIR ORIGIN, SHAPES, PERFUMES, AND COLOURS." By J. E. Taylor, F.L.S., &c. London: Hardwicke & Bogue.—The position we hold in relation to this book prevents our doing otherwise than drawing attention to its publication, although this opportunity affords us the means of thanking both Printer and Publisher alike for turning out so handsome and attractive a volume. The arrangement of the contents is as follows:—Chapter 1, "The Old and the New Philosophy of Flowers;" 2, "The Geological Antiquity of Flowers and Insects;" 3, "The Geographical Distribution of Flowers;" 4, Ditto (*continued*); 5, "The Structure of Flowering Plants;" 6, "Relations between Flowers and their Physical Surroundings;" 7, "Relations between Flowers and the Wind;" 8, "The Colours of Flowers;" 9, "The External Shapes of Flowers;" 10, "The Internal Shapes of Flowers;" 11, "The Perfumes of Flowers;" 12, "Social Flowers;" 13, "Birds and Flowers;" 14, "The Natural Defences of Flowering Plants." The work is embellished with thirty-two coloured figures, and nearly one hundred and fifty woodcuts.

BOTANICAL CURIOSITIES.—Most of these facts were communicated by me to the *Natural History Journal* (W. Sessions, York), a monthly magazine, intended to encourage young people in the prosecution of scientific pleasures. By one path in one field at Woodhouse, near Sheffield, three forms of *Plantago major* have been gathered:—(1) spike bifid; (2) the very small bracts developed into little foliage-leaves, over an inch long below, and lessening towards the top, so as to form an elongated cone, in which the flowers themselves were still present; (3) flowers on branches from the main stem, *i.e.*, in a *raceme* instead of a *spike*. The last form, being very handsome, we have tried to keep in our garden; vainly, however, for it bears no seed, and after two or three years, it dies. Near Sheffield, also, we picked two specimens of *Scabiosa arvensis*; one with its involucrum bracts so large as to extend far out from under the head of florets; the other, long since transplanted into our gardens, where it receives the admiration of all its beholders, with globe-shaped heads of flowers, the peculiar outer ones being absent. In Sherwood Forest, between Edwinstowe and Mansfield Woodhouse, in a sandy lane, in company with *Plantago coronopus*, was a fasciated specimen of *Crepis virens*, several stalks appearing as a single flat one, $1\frac{1}{10}$ inch broad all the way up, and clustered at its summit with flowers. By Wharncliffe Crags, in the Don Valley, a birch, 9 inches at least in diameter, appears at a height of about 12 feet, from out the trunk of an old oak. In a valley through which runs a stream, dividing Yorkshire from Derbyshire, a little tributary of the Rother, once crystal-clear and trout inhabited, now anon black from "sleck washing," and again ochre-yellow from the pumpings out of a colliery, we gathered a dandelion with leaves 2 *feet long*, and proportionately broad; also another with twin heads on one scape. In a valley by Coal-Aston, near Dronfield, *Orchis maculata* appeared in various shades of hue till nearly pure white. White Columbine occurred in Hell Wood—a splendid locality by Roche Abbey, near Rotherham. White Hair-bells (*Campanula rotundifolia*) occurred in Monsall Dale, near Bakewell. My experience is identical with that of a recent writer in SCIENCE-GOSSIP, in the process of drying, White Hair-bells turn blue; Blue Hair-bells, white. Linnæus named the Red and White Campions, *Lychnis diurna* and *L. vespertina*, as one species—*L. dioica*. In Cliff Wheel Wood (Rother Valley), a bed of *Red* Campion contained several with *white blossoms;* nor is it rare to see White Campion, in fields or waysides, assuming a rosy tint. In Hail-Mary Hill Wood (named, as some suppose, from signalling made to the unfortunate "Queen of Scots," then imprisoned in the Earl of Shrewsbury's Sheffield Manor, which is visible from the wood) we collected a *Lychnis diurna*, with leaves all triple-pointed. Near York, we saw all these with white blooms:—*Trifolium pratense, Geranium pusillum, Scabiosa succisa, Calluna vulgaris, Erica tetralix.* In the extreme north of Derbyshire, *Raphanus raphanistrum*, the Wild Radish, was both white and brimstone-yellow. On September 20, at Castle Howard, near Malton, a Dog-Violet (*Viola sylvatica?*), had three unjoined carpels, holding seed, and accompanied by a few small calyciform bracts; Water-cress (*Nasturtium officinale*) was also in flower, and a tangled mass of it rose 5 feet, at least, out of the water. *Rumex alpinus* is a species, doubtfully indigenous; it still grows by One-ash Farm, near Monyash, N. Derbyshire; but this homestead, long tenanted by the Quaker family of Bowmans, was once a place of exile and "durance vile" for the refractory brethren of a Yorkshire Abbey; it is well-known that monks esteemed it virtuous as a healer, and grew it in their herb-gardens. My friend, Alfred Montague Grimsley, of Leicester, found bifid and trifid catkins of *Salix fragilis* by the river Foss, near York. My brother, F. T. Le Tall, observed albids of *Orchis pyramidalis* and *Centaurea nigra*, near Scarborough; he also plucked a Rose (*Rosa villosa?*), *fully double*, many yards from any house, some miles from any village, in one of the deep, narrow, well-wooded, and well-watered gullies lying amid the moorland which extends from Levisham, near Pickering, to Scarborough.—*B. B. Le Tall, York.*

"THE HISTORY OF BIBLE PLANTS."—Under this title, Messrs. Hardwicke & Bogue have just published an attractive little book, written by Mr. J. Smith, A.L.S., of Kew, the well-known botanist. It is abundantly illustrated with lithographic plates by Mr. W. H. Fitch, F.L.S., perhaps the best botanical draughtsman of the day. Mr. Smith's name as author is enough to ensure fulness and correctness of detail.

Perhaps we have never before had so trustworthy—certainly we have never had one so cheap and well got up—a book on Bible Plants. It will make an excellent gift-book for young and old alike.

REPORT OF SCIENCE-GOSSIP BOTANICAL EXCHANGE CLUB.—Your remark (p. 74) on my note regarding *Callitriche autumnalis*—that it will very probably be found in the Till and the lower reaches of the Tweed—in which you say, "We believed this was recorded by Dr. Johnston several years since," is founded on a mistake in the "Flora of Berwick-upon-Tweed" (1829). *C. autumnalis* is there recorded from "Pools of Water in the Vale below Langleyford" (Fl. Ber., i. p. 3). In the "Botany of the Eastern Borders" (1853), by the same author, *C. autumnalis* is left out, which shows that Dr. Johnston had discovered the mistake, although he makes no remark concerning its record in his earlier work, or what species was there mistaken for it. From seeing a specimen of *C. pedunculata*, which was gathered in the above locality, and labelled by Dr. Johnston *C. autumnalis*, and also its frequency in the district, I have no doubt that it was that variety. I enclose an example of a similar form of *C. hamulata*, with all the leaves linear, which is apt to be mistaken, when not in fruit, for *C. autumnalis*, by those unacquainted with that species; but when once known, they are easily distinguished.—*A. B.*, *Kelso.*

GEOLOGY.

THE FOSSIL FUNGUS.—In answer to that part of W. G. Smith's letter on p. 67 of March number, referring to mine on p. 41 of February number, he states that "such a genus as *Peronosporites* was not known till last year," and yet he tells us just previously that it had been known to Mr. Carruthers for many years; and Mr. Carruthers stated in a late presidential address delivered in London, that he only knew of the existence of *two* Palæozoic fungi, one of which he had himself described. My friend Mr. Young being present, at once rose and said that he had a very fine section, showing fungoid growth, in his own cabinet. This is the section that Mr. Smith has in his possession now, and it is the same section that I cut from a specimen of *Lepidodendron* I found on my first visit to Halifax in 1869. The fungus Mr. Carruthers alluded to in his address above mentioned, was found in an Eocene fern-stem from Herne Bay, and is described as *probably* belonging to the genus *Peronospora*. The Manchester gentleman alluded to by Mr. Smith instantly recognized my fungus as *Peronospora* in a fossil state, but it required more learning to give it the name of *Peronosporites*, a distinction without a difference. If Mr. Carruthers is the discoverer of this fungus (as Mr. Smith says he is), how comes it that my friend Mr. Young should write to me as soon as Mr. Smith's paper appeared, and say that my name was to have been mentioned in connection with the discovery, but by some mistake it had been "forgotten"? Mr. Smith tells us what drudgery he has been put to while labouring to find a new name for this fungus, I may tell him that I have also been a "slave" to the study of fossil botany for very nearly twenty years, and that I have pored over my sections too many hours to let either fungus, or any other, new or old, object escape my notice. —JOHN BUTTERWORTH, *Goats Shaw, Oldham.*

GOVERNMENT RESEARCH FUND.—Among the names of those who have received grants from the Government fund of £4,000 recommended by the Royal Society, we find the names of the following:—Prof. H. A. Nicholson and R. Etheridge, jun., "For aid in examining the fauna of the Silurian deposits of the Girvan district, Ayrshire, and in publishing a descriptive list of the same," £73: Mr. C. Callaway, Wellington, Shropshire, "For aid in working out the so-called Eruptive Rocks of Shropshire, and in verifying certain points in local geology," £25: to Dr. J. W. Dawson, Montreal, "For aid in excavating erect trees in the Coral Formation of Nova Scotia, in beds where they are known to contain reptilian and other remains," £50: to Dr. R. A. Traquair, Edinburgh, "For aid in preparing and publishing a monograph on the Carboniferous ganoid fishes of Great Britain," £75: to Dr. Henry Woodward, "For continuation of work on the Fossil Crustacea, especially with reference to the trilobites and other extinct forms, and their publication in the volumes of the Palæontographical Society," £75: to Prof. H. G. Seeley, "For an examination of the structure, affinities, and classification of the Extinct Reptilia and allied forms," £75: to Rev. J. F. Blake, "For aid in continuing the publication of a Synopsis of British fossil Cephalopoda," £100. Besides the above, we find the names of W. Saville Kent, Jersey, "To pay for microscopical apparatus for the further prosecution of investigations into the structure and life-history of certain lower Protozoa," £50: to R. M'Lachlan, "For aid towards the publication of a revision and synopsis of European *Trichoptera*, £50: to Prof. A. H. Garrod, "For aid towards publication of the second fasciculus of an exhaustive Treatise on the Anatomy of Birds," £100: to Prof. W. K. Parker, "For assistance in continuation of researches on the Morphology of the Vertebrate Skeleton; and the relations of the Nerves to the skeleton structures, chiefly in the head," £300.

FOSSIL WALRUSES.—The Ipswich Museum now contains a splendid series of tusks of the fossil walrus (*Trichecodon Huxleyi*) found in the Red Crag. These were recently sent up to the Linnæan Society by J. E. Taylor, and described by Prof. Ray Lankester. It was discovered that the two supposed species were in reality tusks of male and female animals.

THE TRIASSIC STRATA OF THE SOUTH-WESTERN COUNTIES.—At a recent meeting of the Geological Society of London, a paper was read by Mr. W. A. E. Ussher, F.G.S. The author maintained that the general thinning-out of the Trias in the South-Devon and West-Somerset area as it is traced northward, of which he adduced evidence, proves that this area was not connected with that of Gloucestershire and the Midland counties until the later stages of the Keuper; and endeavoured to show by a comparison of sections that the area east of Taunton and south of the Mendips was not submerged before the deposition of the Lower Keuper Sandstone, and probably not until the later stages of its formation, the Quantocks acting as a barrier dividing the Bridgewater area from the Watchet valley. He thought that a subsidence progressing from south to north led to earlier deposition in South Devon, and to a consequent attenuation of the lower beds towards Watchet and Porlock. Hence the lowermost beds of the Trias of the south coast are much thicker than their more northerly equivalents, and probably were still thicker where the English Channel now flows, some beds perhaps dating as far back as Permian times. The presence of numerous fragments of igneous rocks (quartz-porphyries) in the basement-beds of the South Devon Trias, and the absence of known corresponding rocks in the county, led the author to infer that the cliffs and beds of the early Triassic sea were composed of such rocks, any undestroyed portions of which would probably occur either under the Triassic beds near Dartmoor and between Newton and Seaton, or in the area now occupied by the English Channel. As continuity is evident only in the upper division of the Trias, between the area of Devon and Somerset and that of the Midland counties, and there is no conformity in the former, the author maintained that the upper marls, upper sandstones, and probably the conglomerate and pebble-bed subdivision of Devon and Somerset, are equivalent in time to the Keuper series of the Midland counties, and that deposition took place in Devon and Somerset between Keuper and Bunter times, bridging over the hiatus marked by unconformity in the Midland counties.

THE NEWLY-DISCOVERED DINOSAURS.—Prof. Marsh has named the new family of gigantic fossil Saurians, recently discovered in the Oolitic rocks of America, *Atlanto-sauridæ*. One species (*A. immanis*) had a femur over eight feet long, and, taking a crocodile as a comparison, Prof. Marsh thinks that *A. immanis* may have been more than one hundred feet in length!

AN AMERICAN FOSSIL CERATODUS.—Prof. Marsh has recently described the dental plate of a fossil fish belonging to the curious existing Australian genus *Ceratodus*, under the name of *C. Güntheri*. It was found in the upper Oolitic deposits of Colorado, and is the first specimen of *Ceratodus* which has been found in America.

FOSSIL INSECTS.—At a recent meeting of the Entomological Society of London, Mr. H. Goss exhibited a collection of fossil insects from the Leaf-beds at Bournemouth. They had been obtained by M. J. S. Gardner, F.G.S. Among them were numerous *Coleoptera* and *Hymenoptera*, including a finely-preserved anterior wing of *Œschna*.

ARTIFICIAL ALBITE AND ORTHOSE.—In addition to the artificial Corundum, Ruby, &c., which have been made by Messrs. Fremy & Feil, M. Hautefeuille now announces similar artificial reproductions of *Albite* and *Orthose*, which have both been discovered in the copper furnaces, both at Mansfeld and in the Hartz. It is supposed they have been formed by sublimation, with the aid of the calcium chloride employed as flux.

THE GEOLOGY OF IRELAND.—A want long felt by all students of Irish geology has been a good text-book. We understand that before the meeting of the British Association in Dublin in August next, a "Manual of Irish Geology," by Mr. G. H. Kinahan, will be published. With the exception perhaps of Sir Richard Griffith, there is no one more competent to write such a book than Mr. Kinahan. The work will have a description of the sedimentary rocks, and also of the igneous, or, as the author calls them, "Eruptive" rocks, chronologically arranged, together with short descriptions of the superficial deposits, minerals, mines, soils, and prehistoric remains, including the Crannoges, Kitchen-middens, &c.

NOTES AND QUERIES.

BIRDS' EGGS.—"L. W. G." (p. 43) is mistaken in stating that an Act of Parliament has been passed to prohibit the taking of birds' eggs. The taking of the birds only, during the close time, is prohibited by the "Sea-birds' Preservation Act," 1869; the "Wild-birds' Protection Act," 1872; and the "Wild-fowl Preservation Act," 1876. Therefore, no person can "break the laws of the land in this particular," except in the case of eggs protected by the Game Laws.—*R. Egerton.*

THE MARTEN (*Martes foina*).—Modern invasion of its haunts with axe and gun has rendered this a very rare animal in Cornwall. The capture of a female is thus noticed in the *Western Morning News* of March 15th:—"The marten cat, which is now almost an extinct quadruped in England, has occurred at or near Delabole within the last ten days. It was caught in a gin, and proved to be a female. It is the finest and the most elegant of all the weasel tribe, and it more frequently is observed in trees, along the branches of which it may be seen creeping or jumping after its prey, which consists of birds, squirrels, &c. Its actions are most graceful and elegant, and it is to be regretted that so beautiful a wild animal, which used to be more or less seen in our woodlands, should be extirpated and lost. There are two varieties, not now supposed to be specifically distinct, viz., the common,

or beech marten, with a white breast, and the yellow-breasted, or pine marten. It is now supposed that the yellow-breasted sort is a younger animal than those which have a white breast; at all events, specimens have been obtained from the same covert, having an intermediate tone of colour. Foxhounds hunt this animal with great eagerness, and seem to like their scent. It has been remarked that the viscid effluvia belonging to the other members of the Mustelidæ does not exist in the Marten, which has the usual glands for the secretion of humour; but, instead of a fetid smell, it emits a musky and rather agreeable odour."

Worms in Sticklebacks.—I have been waiting patiently for some answer in the pages of Science-Gossip to a letter of mine asking the nature and reason of the occurrence of large flat worms in every stickleback taken from a certain pond. These worms, in number as many sometimes as six, seemed almost to fill the fish, and to cause their death in our aquarium. The matter seems to me both curious and interesting, and I should be glad if some correspondent would give an account of them.—*W. E. Thompson.*

Tree-creeper. — Leaning against a tree in Hyde Park, London, I saw a Tree-creeper, *Certhia familiaris*, alight on a tree close to me and begin searching for insects. I watched it for some time, till it flew away to another tree, whither I followed and again watched it. Are they often seen in London?—*Arthur S. Blackett.*

The Botany of the Channel Islands.—Can any of your readers give me any information as to the best method of conducting a botanical tour in the Channel Islands? Is the living there expensive or not? Is it best to put up at hotels, or at farm-houses? Any such information will be most acceptable.—*J. Comber.*

Frog-spawn.—I send a few notes on some frog-spawn collected on March 14th of the present year, and exposed only to the natural atmosphere. March 15th, at 7 p.m.,—a few tadpoles free from the albumen. March 20th, all out of the embryo state, and, by the 22nd, the gills clearly visible. During the cold weather at the latter end of the month, the tadpoles lay at the top of the water, apparently stupefied. —*R. E. S., Richmond.*

Midnight Songsters. — In reference to the thrushes and blackbirds, together with other of our sweet songsters, singing at midnight during the early spring and summer months (Science-Gossip, page 93), we have often noticed this fact with surprise, especially on a fine bright night, when the chorus of song seemed to be carried on through the night, with very little cessation, increasing in liveliness as the early morning dawned, causing one to remark that the birds sang all night as well as all day long. Some four years since, about the months of May or June, many people visited our neighbourhood (Newcastle, Staffordshire), to listen to the sweet music of the various birds singing far on in the night; among which was one of the warblers, whose note was so sweet that it was mistaken for a nightingale. The latter bird has rarely been known to come so far north.—*E. Edwards.*

Cucumber and Black Beetles.—In reply to Mr. Smyth's question, as to whether the peel of the cucumber destroys as well as allures the beetle, I venture to remark that it does both. Some members of my own household have tried the experiment; the smell of the cucumber peel allures the beetles, and after eating it they die almost directly, some close to the peel, others as they are moving away from it, to retire in their holes.—*E. Edwards.*

What is the Whipultre (Science-Gossip, No. 160, p. 95).—I do not think Chaucer's "Whipultre" has ever been satisfactorily identified, and I can only make a very diffident suggestion as to the species meant. In some dialects the cross-bar from which horses pull a plough is called a "whippletree," and these are generally, if not always, made of ash. It is possible, therefore, that the whipultre is the ash; and it might be so called because whipple-trees were made from the wood, or the instruments might be named from the tree of which they were made. This view receives confirmation—very slight, it is true—from the fact that whilst most of the more common trees are mentioned by Chaucer in the passage indicated, the ash is omitted from the list. The Cornel-tree (*Cornus sanguinea*) has been suggested, but I do not know on what grounds.—*Robert Holland, Norton Hall, Runcorn.*

Fluid for Strengthening Bones, &c.—Will some of your readers inform me whether dilute silicate of potash, recommended some time back by one of your correspondents for strengthening fragile shells, is suitable for fragile small bones and teeth, say, of Arvicola, &c.?—*John Fuller.*

Preserving Skins.—Sir, I should feel greatly obliged if any one could tell me of any means of preserving the skins of birds and other animals without the use of arsenic and corrosive sublimate, or any other poison. If you will be good enough to answer this query in the pages of Science-Gossip, kindly do so under the initials "J. Y."—*J. Young.*

The Colorado Potato-beetle.—Without affecting to undervalue Mr. Rye as an antagonist, I certainly should not have asked you for any portion of your space to reply to him had he not chosen to indulge in insinuations, as I think, totally uncalled for. Notwithstanding Mr. Rye's strictures, I adhere unflinchingly to the positions taken in my first paper. 1st. That the potato-beetle is not of such great import as to justify Mr. Rye in dubbing him an "oppressor," nor in saying that "earnest and energetic steps should be taken at the present unprecedented juncture" to prevent the access of the foe to the shore of Great Britain. 2nd. That although it is well to exercise vigilance in this matter, I do condemn the use of Paris green as a curative agent, because dangerous and totally unnecessary; and I say again, without intending any reflection against anybody in particular, that the notoriety given to Paris green in America is very probably due to the cause mentioned in my first paper. As to the "fouling of the nest," then, the charge would appear to be groundless; but whether or not, I contend that this is one of the cases in which truth should prevail. Mr. Rye appears to think that I have unjustly classed him among the *alarmists.* I never so classed him, except by implication. Will any one read over the first part of Mr. Rye's article in your September number, and say whether such a classification would not have been correct? To be sure he does, in your March number, inform us that the article "was written sarkastic," and as I did not appear to see the "*sarkasm,*" he impeaches my knowledge of the English language. I fear that I shall have to plead guilty; but the language used by Mr. Rye is in general anything but funny. Still he ought best to know whether or

not he was "funning," and if he insists upon it that "it is all a joke," there is an end of the matter. In conclusion, I object to Mr. Rye's dragging into this matter the names of gentlemen not even alluded to by me; thus implying that my remarks had reference to some or all of them. There is nothing in my paper justifying such implication. Mr. Rye thinks that my concluding "caution" betrays an ignorance of the British insect fauna, "remarkable in one who proposed to allay our fears," &c. &c. I confess to a respectable amount of ignorance of British insect fauna, although I have Rye's "British Beetles," and one or two other things of the kind; and why ignorance on such a point should be remarkable in a person professing some knowledge of potato-beetles, I cannot imagine. My notion was that, in case the potato-beetle did arrive, it was just possible that some of its parasites might arrive with it; and further, that striped beetles might appear in potato-fields, which, if mistaken for *D.* 10-*lineata*, might have their existence shortened without cause.—*W. Andrews.*

The Song Thrush and Missel Thrush.—Mr. Ingleby asks if it is not an unusual occurrence to find the Missel Thrush (*Turdus viscivorus*) nesting on the top of a wall. It is certainly an unusual occurrence; but it should be borne in mind that birds frequently build in strange places, and mostly from necessity. The Missel Thrush loves to build in gardens, shrubberies, and orchards, though at other times it is a wild and shy bird. Possibly the owners of the nests referred to by Mr. Ingleby could not find suitable nesting-places in trees or bushes, or their previous nests may have been plundered by prowling cats, who destroy many nests of young song thrushes, blackbirds, and missal thrushes in gardens. The birds, no doubt, finding they could not keep their young from cats or vermin in their ordinary nesting-places, finally built their nests on the top of a high wall, where, it is to be hoped, the parent birds succeeded in safely rearing their broods. In my district, where there is little shelter for the early breeding birds, blackbirds and song thrushes sometimes build their nests in stone walls, and in the roofs of open haysheds. "G. S. B." has fallen into a singular mistake. He intimates—though his statement is not over clear—that he has discovered a Song Thrush and Blackbird mating together, and rearing, we must suppose, a hybrid brood. Had he described how the nest was constructed, the question might easily have been settled. The eggs with "claret markings" were undoubtedly those of the Missel Thrush, and the female which he saw hatching, and which he states was a Song Thrush, was, no doubt, a female Missel Thrush. If "G. S. B." cannot distinguish between the eggs of the Song and Missel Thrush, he would easily jump to the conclusion that the female Missel was, as he states, the Song Thrush. The nest, which he has not described, would be lined with dry grass or hay, if the eggs found therein had "claret markings." The eggs of the Song Thrush are blue with black blotches, densest at the thickest end; though I have several Song-Thrush eggs in my collection which have not a single speck of black upon the blue. The nest of the Song Thrush has always an inner lining of hardened clay or cattle-droppings, while the nest of the Missel is invariably lined with dry grass. This latter bird is a very early breeder. His favourite nesting site is in the fork of a tree, not often very high up. I have seen the nest of a Missel Thrush on the bare branch of a tree projecting over a public footpath, and the nest was so conspicuous that it was plainly visible at least twenty yards off. The Missel is our largest song-bird, and though in colour and markings it is not unlike the Song Thrush, yet it is much larger. The cock bird commences to sing very early in the year. In stormy weather it sings best, and on this account the Missel Thrush is called the "storm cock" in many parts of the country. The nest and eggs described by "G. S. B." are those of the Missel Thrush. This correspondent also seems to believe that the Blackbird and Song Thrush breed together. Such an unusual occurrence, so far as I know, has never been recorded by any naturalist; and "G. S. B." cannot be wrong if he describes the eggs in his cabinet as those of the *Turdus viscivorus*—viz. the Missel Thrush. If he is still in doubt as to the identity of his eggs, if he will send me one in a small box, I will name it correctly and return it. At the same time I have no hesitation in asserting, from his description of the nest and eggs, that they are those of the Missel Thrush.—*H. Kerr, Bacup, Lancashire.*

Aquarium for Microscopic Work.—As two or three of my friends, with myself, are anxious to construct a small domestic aquarium (say about thirty inches in length), for the purpose of keeping in stock objects for the microscope, will you or any of your contributors to Science Gossip kindly supply us with information how to make one—size, shape, and material, &c.? I feel certain our thanks, with those also of many of your readers, would repay you or them for your kindness.—*W. D. B.*

"Gooseberry.—Dutch, *Kruis berry*, Cross-berry, from its triple spines forming a cross."

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

M. R. D.—Your species are as follows:—No. 1. *Filago minima.* No. 2. *Filago germanica.* No. 3. *Filago spathulata;* the last species is much more unfrequent than the first two. No. 4. We should not like to name anything from single leaves. No. 5. *Ægopodium Podagraria;* L. No. 6. *Angelica sylvestris;* in future dry them a little before packing them for post, they are then much more easy to determine, because they travel in a better state.

J. C. (Helston).—Thanks for inquiry. Your parcel, No. 2, has been sent.

A. W. Rosling.—The only Flora of the Isle of Wight we can advise you to purchase is Bromfield's "Flora Vectensis." This is both a valuable and reliable work.

F. H. A. (Fishbourne).—We have several letters expressing the interest felt in "Botanical Work for April." You are quite correct. No. 1. *Viola Reichenbac iana;* a very characteristic specimen. No. 2. *Draba brachycarpa.* Look out for *Ranunculus ficaria*, and its varieties; yours is a good locality for it.

B M. W. (Hentland, Ross).—The specimens are, as you judge, Micro-fungi. No. 1. *Trichobasis Geranii*, or Geranium Rust. We are unable to detect any perfect fungi on No. 2, perhaps you would send another example when more mature.

Science-Gossip Botanical Exchange Club.—Amateur Botanical Collectors wishing to join the Club this year, should as early as possible state their wishes. To save the promoters from any loss, a small charge of say five shillings will be made; this may be remitted when the parcels are sent in October. Rules to guide our members will be sent in May to those only who announce their names. The Rules this season will contain the numbers of species particularly wanted; these numbers will correspond with the London Catalogue, 7th Edition, published by Hardwicke & Bogue, post free, sevenpence.

M. R. D.—The Poison Ivy is the *Rhus Toxicodendron.* You must not, however, confound it with our "rare old plant," the English Ivy, which is *Hedera Helix.* The *Rhus* is used as a remedy for paralysis, but we do not know the results.

S. A. B (Allan, Dungannan).—The specimen enclosed was *Disandra prostrata.*

D. S.—The leaf-like excrescences are not a fungus, but a gall.

X.—We are not aware that any book has been published on sea-side pebbles except that of J. G. Francis, called "Beach Rambles," which is as full of geological errors as it could possibly be.

B. HOOKER.—Your larva of the goat-moth should be kept in a tin or wire-gauze box, and a large piece of half rotten ash-wood placed with it. It will appear as a moth the third year from its commencing its life as a caterpillar.

D. COOPER.—There is no doubt your specimen is *Clausilia laminiata*, in which the mouth is almost entirely deflected to the side opposite to that on which it is usually found.

R. RAMSAY.—You will be able in your subsequent geological reading to answer your own difficulty better than we can in the short space at our command. But we may say that the reason why it would be futile to bore for coal through the Oolite or Wealden would be on account of the *known thickness* of the overlying formations. 2nd. Your highest Scotch mountains have nothing to do with the thickness of our old red sandstone. The thickness of the latter is known from observing the angle of the dip of the strata, and the area covered by the outcrop. If you study Page's "Geology," you will soon get over your present difficulties. Persevere!

A. SELLS.—Your Zoophytes are: No. 1, *Flustra foliacea*. No. 2, *Sertularia operculata*. No. 3, *Dasya coccinea*, a sea-weed. No. 4, *Sertularia argentea*. Nos. 5 & 7, *Sertularia filicula*. No. 6, *Plumularia falcata*. No. 8, *Antennularia antennina*.

A. WHELDON.—You will find full instructions for "sugaring" for moths, &c., in "Collecting and Preserving Natural History Specimens," published by Hardwicke & Bogue, 192, Piccadilly, at 3s. 6d.

A. G. N.—Your specimen is an English plant, usually found growing in such localities as that you name. It is the curious Butcher's Broom (*Ruscus aculeatus*).

J. W. N. and Others.—It is intended to revise the rules, &c., of the Botanical Exchange Club. Due and full notice of revision, &c., will be given in our columns. Application for membership can then be made.

W. HOBBS.—Very likely your chrysalides will develop early during the coming summer.

J. P. THOMPSON.—We understood that a new edition of Pritchard's "Infusoria" was postponed. Lownde's "Anatomy of the Blow-fly" can be had of Messrs. Hardwicke & Bogue.

R. B. N.—The fossils are corals, belonging to the Silurian formation. No. 1 is the "Chain-coral" (*Halysites catenipora*), and No. 2 is *Favosites Gothlandica*. The small shells which you think look like "cockles" are in reality not bivalves, but specimens of *Molluscoidea*. They are fossils belonging to a group (*Brachiopoda*) once as abundant as they are now rare. The name of those enclosed is *Rhyconella Wilsoni*.

T. MCGANN.—Your entomostracans are the male and female of *Canthocamptus minutus*. Your slides are very well got up indeed.

A. S. A.—Get "Collecting and Preserving," published by Hardwicke & Bogue, 192, Piccadilly, price 3s. 6d., and read the article on collecting butterflies and moths, by Dr. Knaggs, and beetles, by Mr. E. C. Rye.

EXCHANGES.

DUPLICATES.—A number of Lepidoptera in good condition, and well set. Desiderata: Birds' Eggs, side-blown, not in my collection.—R. Kay, 2, Spring-street, Bury.

WANTED, Newman's or Stainton's "Lepidoptera." Offered 5 vols. bound, and 3 unbound, SCIENCE-GOSSIP, and other books.—W. E. Green, 24, Triangle, Bristol.

J. W. BULMER, near the church, Northallerton, Yorks., will exchange Jackdaw's, Lapwing's, Song Thrush's, Moorhen's, Stock-dove's, Starling's, &c., birds' eggs, for other varieties of eggs.

WANTED, British or foreign Stone Implements and Weapons of any kind; Stone Hammers, Chisels, Wedges, &c.; also Tools and Weapons wholly or partly composed of stone, relating to any uncivilized race of men.—W. M. Cole, 93, St. Helen's-street, Ipswich.

BIRD'S Eggs, 250 varieties, valuable duplicates, side-blown, including many unprocurable species. Desiderata: Species new to collection. Exchange lists supplied. All letters answered. Sissons, 11, Priory-road, Sharrow, Sheffield.

WELL-MOUNTED Slides of injected human Kidney, Palate of Whelk, and transverse Section of Porcupine Quill, in exchange for others mounted in balsam.—J. A. Kay, Mansion House, Brompton, Chatham.

WANTED, some good Polariscope Objects, for others or cash. —T. Brown, 7, Spencer-street, London, E.C.

FOR Elytron of Diamond Beetle, or Skin of Tench or Sole, Polar-mounted, send well-mounted objects or material to Thomas Shipton, Chesterfield.

SLIDE, as announced in last month's SCIENCE-GOSSIP, offered in exchange for first-class prepared material (unmounted). Box must accompany material to be returned with slide.—James Simpson, 15, Prospect-place, Dumbiedykes-road, Edinburgh.

LONDON CATALOGUE, Seventh Edition, Nos. 19, 121, 122, 130, 133, 201, 265, 267, 349, 394, 396, 497, 533, 542, 534, 841 b, 860, 888, 912, 923, 1014, 1040, 1109, 1142, 1310, offered for any of Nos. 775 to 807 inclusive.—W. Jones, Manchester-street, Oldham.

FOR *Batrachospermum moniliforme* and *Tabellaria ventricosa*, both just as collected, send objects of interest.—W. West, Chemist, Bradford.

WANTED, Westwood's "Introduction to the Classification of Insects," for foreign insects (chiefly parasites), mounted or unmounted.—M., Anglesea Lodge, Godalming, Surrey.

WANTED, a few Eggs of Lepidoptera, and Micro-Lepidoptera, whole for mounting, in exchange for really good slides.—T. H. Buffham, Clarendon-road, Walthamstow.

WANTED, a Coddington Half-inch Lens, Matthews or other Turntable, and a Section-cutting Machine. Can offer good Micro Slides, &c.—Wright, 8, Grosvenor-road, Headingley, Leeds.

WILL exchange "Live Stock," Journal, cost 8s., and other books, for back numbers of SCIENCE-GOSSIP, or scientific works. E. Velge, 41, Peckham Grove, London.

WANTED, every description of Mounted Objects and Microscopic Apparatus, in exchange for Mounting Materials. A list sent to all applicants. Foreign correspondence solicited. All letters answered.—E. Atkins, 200, Essex-road, Islington, London.

WANTED, Volumes of SCIENCE-GOSSIP, Coleoptera, or Books on them, in exchange for very large Latin Book on Insects, date 1634. "Insectorum sive minimorum animalium Theatrum." Calf, full of woodcuts of all insects, exchange value 15s.—J. N. Minnitt, 5, Regent-street, Nottingham.

WANTED, Wood Sections, Fish Scales, Hair Sections, and every variety of Unmounted Objects, for Mounted Objects (good).—C. W. Lawton, 200, Essex-road, Islington, London.

WANTED, unmounted, Ripe Capsules of Mosses, Sori of Ferns, cleaned Polycystina and Foraminifera. Well mounted Slides in exchange.—Send postal slide-box for return to T. Sherlock, 32, Exchange-street, St. Helens.

FOREIGN SHELLS.—Duplicates, mostly of Japanese, Chinese, Burmese, Java, and Philippines, Australian.—Desiderata: principally North and South American, West Indian, Mediterranean, Spanish, French, Algerian, and Egyptian; also duplicates of about fifty sorts of British Land and Freshwater Shells for the above desiderata. Exchanges invited.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

LONDON CATALOGUE, 7th edition, wanted, 1479, 1495 b, 1496 b, 1505, 1511, 1513, 1520 b, 1523 b, 1531 b, 1535 b, 1548, 1572 b, for 1447, 1449, 1448, 1136, 1145, &c.—B. M. Watkins, Treaddow, Hentland, Ross, Herefordshire.

A FIRM, substantial, Equatorial Stand for Telescope for exchange. Wanted, a Foot-lathe, good Magic Lantern, or Scientific Apparatus.—Address, H. Morland, Cranford, Middlesex.

MOSSES.—Wanted, a Northern Correspondent to exchange Species from the West of England District.—Address, E. Wheeler, 31, Triangle, Tullen-road, Bristol.

RARE British and Foreign Eggs to exchange for others not in collection. All letters answered.—J. T. T. Reed, Ryhope, Sunderland.

WILL exchange any class of neatly-mounted Micro Slides or Material, Diatoms *in situ*; Parasites or their Eggs particularly wanted. Prefer to send stained vegetable preparations unless otherwise requested.—W. Teasdale, Headingley, Leeds.

BOOKS, &c., RECEIVED.

"Popular Science Review." April.
"Land and Water." April.
"Midland Naturalist." April.
"Scottish Naturalist." April.
"American Naturalist." March.
"Science pour Tous." March.
"Bulletin de la Société Belge de Microscopie." February.
"Feuille des Jeunes Naturalistes." January, February, March, and April.
&c. &c. &c.

COMMUNICATIONS HAVE BEEN RECEIVED UP TO THE 10TH ULT., FROM:—B. H.—D. C.—C. W. L.—A. J.—H. B.—J. W. D. K.—A. W.—H. A. M.—B. B. T.—J. F.—Col. B.—B. P.—P. T.—H. K.—T. Q. C.—Dr. E. De C.—W. B. G.—H. F. B.—W. R. M.—F. A. P.—A. P.—G. N. M.—R. N.—C. L. P.—J. N.—R. E. S.—W. T.—W. H. B.—W. J.—J. P. S.—R. R.—J. C.—Col. M.—W. V. A.—W. W.—H. L. G.—B. M. O.—R. H.—W. H. H.—J. C.—E. W.—J. T. T. R.—A. S. B.—T. W.—T. H. B.—J. D.—E. A.—W. E. G.—C. F. W.—W. M. P.—J. W. B.—J. A. K.—Dr. E. H. V.—A. G. N.—J. W. N.—R. K.—W. H. W.—F. H. A.—W. W.—T. S.—T. B.—E. V.—J. C.—J. K.—H. W. S. W. B.—J. W. C.—J. S.—J. T. P.—J. P. T.—H. P. M.—T. S.—H. N. B.—J. W. S.—W. S.—J. McG.—W. E. J.—H. M.—B. M. W.—W. D. B.—J. P.—W. H. B.—G. L. H.—T. W. D.—A. B.—E. W. M.—A. S.—H. B.—A. S. A.—G. A.—&c. &c. &c.

THE HABITS, FOOD, AND USES OF THE EARTH-WORM.

(*Lumbricus terrestris.*)

BY PROFESSOR PALEY, M.A.

IF there is a creature of tolerably large size which one would be disposed at first sight to place lower than most others in the scale of creation, it is the common lob-worm. To an unobserving eye a very simple organism without any particular head or tail, and possessing only a slightly rough and bristly body of tubular form, composed of contractile rings—from which the class it belongs to is called *annelidae*—it is regarded by most people as a rather ugly, but harmless, wriggling thing, slimy and disagreeable to touch, unsightly to look at, and about as destitute of interest as anything that lives and moves and has an independent existence. But all this is founded on a false estimate, and the false estimate is, as usual, founded on ignorance. The lob-worm may almost be called a clever and intelligent creature; very shy indeed of letting its mode of action be seen, but showing by certain results, which readily come under our observation, that it has instincts which fall very little short of reasoning and design. And yet this creature has "no eyes, nor any other organs of special sense that are known."*

There are difficulties in ascertaining the habits of the lob-worm, first, from its timidity and watchfulness, next, from its rarely appearing on the surface except at night, thirdly, from its operations being conducted almost entirely under ground. It is immediately conscious of the tread of an approaching foot, or of the least tremor of the earth, such as is caused by digging or any garden-work. In these cases it acts in two apparently opposite ways. If a stick or a spade be thrust deep into rich garden-soil, in which large lob-worms generally abound, and moved to and fro, several of them will crawl out of their holes, even at the distance of a yard, and wriggle about on the surface. In this way the extraordinary elasticity of the creature may be seen. It can stretch itself out to more than twice its natural length, and its power of locomotion consists in its turnings and twistings, its grasp of the earth by its short stiff bristles, and by forming its head into a kind of hook or anchor, and then dragging its body towards it. But if, walking gently, and towards evening, you chance to see a worm partly out of its hole, it will immediately retire into it. Blackbirds and thrushes may be watched pulling long writhing worms out of a grass-plot, and devouring them; but if you walk across the same grass you will not find a single one. The reason is, that the light hop of the bird does not warn the worm of its approach; the bird sees just the head protruding, and by a dexterous clip and jerk he extracts the delicate morsel, and bolts it whole—alive and kicking.

The lob-worm has a singular habit of filling up the entrance of its hole with fallen leaves, bits of stick or straw, feathers, or any small and light objects—it is rather fond of bits of string—that it finds near. If it cannot get these, it piles up a little hillock of pebbles or small bits of lime, cinder, &c. Why it does this, it is not easy to make out. Possibly it is to allow the passage of air into the hole, and yet to prevent the intrusion of insects, such as beetles, or ants, which would give it as much trouble and annoyance* as a ferret gives to a rabbit in its burrow. For if it were solely for purposes of food, which fallen leaves or seeds of trees might be, and apparently are, the worm would not draw in such indigestible delicacies as string or feathers. Perhaps they pull in anything that they find soft and yielding, and make trial of its edible qualities at their leisure. Whatever be the reason, the holes are carefully stopped up in the way I have described. This seems, indeed, rather stupid; because a knowing bird may regard the tufts upon worm-holes as so many points for attack; but

* Huxley.

* In Mr. Taylor's "Half-hours in the Green Lanes," a slug (*Testacella haliotidea*) is described as "the terror of the common earth-worm" (p. 211).

this is the habit of the creature, and as I once, and once only, caught a lob-worm actually at work, I shall describe what I saw, which I thought extremely curious.

My attention was directed to the fact that if the small heaps of pebbles were cleared away from a worm-hole, they were sure to be replaced next morning. Suspecting they worked only at night, I went late one summer evening, after a shower of rain, to a bed in the garden which was very full of earth-worms. Walking up to it on tip-toe, and with extreme care (for I was well aware that if it felt the footstep two or three yards off, it would retire into the hole), I was lucky enough to see one very big worm with its body about half out of the hole. I then stood for some time perfectly still, and watched it as it reached out its elastic head to a small pebble, and by a clever jerk, or possibly, by its slimy moisture adhering to it, it drew the pebble to its hole and left it close to the edge. Thus it took another and another, and now I was able to explain what I had often noticed, that every pebble within a circle of about six inches was moved away and piled up over the hole. The worm took the circle, elongating its body, and moving east or west and to every point of the compass, so to say, till not a pebble was left within its reach. This I *saw*, and the reader may believe that it is a strictly accurate account, though it may seem to credit the creature with more intelligence than it has any right to possess.

I believe the same may be seen by anyone who will take a lantern into the garden late on a summer's night, for they can hardly be conscious of light; even of this, indeed, I have sometimes entertained a doubt, though I cannot explain it in an eyeless creature. Certain it is that on gently uncovering a pot of earth containing a lob-worm, and bringing a candle to examine it, when it happens to be above ground, the creature will almost always immediately disappear.

But the feat which I saw performed is nothing to what I am going to describe. I found on a gravel path in my garden, and on the grass-plot adjoining, a number of worm-holes, all stopped up with the long narrow leaves of the weeping willow, which had fallen in the late autumn, and had been placed erect in small bunches. On examining separately a number of these leaves (of which each hole contained on the average about twenty, though many of them had more), I found, to my surprise, that *every leaf had the stalk-end uppermost*, and the other end rolled together into a kind of plug so as to fill up the hole. Very rarely indeed, perhaps in one or two out of a hundred leaves, the creature had made a mistake, and put the stalk-end *downwards*. But in these few leaves the end was quite entire, whereas the leaf-plugs in general seemed to have been nibbled or *partly eaten at the ends within the holes*. Evidently the stalk-ends were too tough, and the worm had the extraordinary intelligence, blind as of course it is, to find out by the touch the right and the wrong end, and to make use of each leaf accordingly.

The mouth-end (so to call it) of a lob-worm has many analogies to an elephant's trunk. It can curl it and twist it, make it blunt or sharp, curved or hooked, as it pleases; and it is evident that an acute sense of feeling resides in it. Therefore, recklessly to chop worms in half with a spade, on the plea that they do not feel, or to impale them on fish-hooks, is cruel, even though we take old Walton's advice and perform the operation "tenderly."

Worms feed by a kind of suction, as well as by digesting vegetable fibre; they pass *earth* through their long tubular stomachs, and eject it on the surface in those little hillocks which we call worm-casts, and which so much disfigure our closely-mown lawns, till we flatten them down with the garden roller. But these worm-casts perform more than one very important function.

(*To be continued.*)

BOTANICAL WORK FOR JUNE.

IN taking our usual daily walk in the spring months, we have often seen the Chickweed, Marsh Marigold, and Water-blinks. We select these species because they are so common as to be generally passed over with the remark, "Oh, it is only the Chickweed," and so on.

Stay, however; not quite so fast. The poor Chickweed, despised because it is so common, covers, without doubt, three distinct species. As the result of a careful examination, extending over twelve years, we now regard this despised plant with deep interest, and, at a glance, can detect the three species we now lay before our readers :—

First.—The *Stellaria media*, Linn., may be recognized by the *line of hairs* on the stem and branches.

1. The true *S. media*, Linn., has five stamens; petals invariably present.

2. *S. Boræana*, Jord., is devoid of petals; stamens three.

3. *S. neglecta*, Weihe. Sepals with long hairs, often as long as the petals; stamens ten. Note.—We are unable to detect any good specific distinction betwixt *S. umbrosa* and *S. neglecta*.

Further.—No. 1 has showy flowers, with few branches, about four inches long. No. 2 is a small tufted plant; branches very short; flowers inconspicuous. No. 3 is not unlike dwarf specimens of *Stellaria nemorum*, L.; branches sometimes eighteen inches high; leaves large; flowers large.

Our next species is the Marsh Marigold (*Caltha palustris*). For many years we overlooked this species, but now it seems like an old friend altered by long absence. It is split up into three varieties; but we now only notice those which are common, or

of frequent occurrence, so as to throw a new charm to our spring rambles :—

Caltha palustris, L.

1. *C. vulgaris*, Schott. Flowers large, one and a half to two inches across; sepals meeting at the margins; follicles (seed-vessel) with a short beak; branches stout, very few.

2. *C. Guerangerii*, Boreau. Flowers numerous, very small; sepals spreading; follicles with a long beak.

No. 1 is generally found in swampy situations; No. 2 in brooks, &c.

Another plant is often overlooked, the lowly *Blinks*.

Montia fontana, L. In this instance new names have been introduced to distinguish each separate plant.

No. 1.—*M. minor*, Gmelin. Stems short and tufted; flowers inconspicuous; tubercles on seed with a *raised point*. This bears a striking resemblance to *Stellaria Boræana*, Jord.

No. 2.—*M. rivularis*, Gmelin. Stems long, solitary, thick and flaccid; tubercles on seed with flattened point.

We regard No. 1 as a very distinct species; it alters not in a state of cultivation, but is rather rare in the northern counties.

Who does not recognize with feelings of delight and joy the pretty Milkwort? (*Polygala vulgaris*, Linn.) Probably no British species has been split up more frequently, if we except the Rubi. After years of toil in looking up these sub-species, and after examining, may-be, thousands of specimens, we have come to the conclusion that the so-called *P. vulgaris*, as originally described by Linnæus, includes two well-marked forms, as follows :—

No. 1. *P. vulgaris*, L. Racemes, many-flowered; leaves scattered, lanceolate; branches numerous, ascending.

No. 2. *P. depressa*, Wend. Racemes few flowered; flowers small, white or pink; leaves often tufted below, or crowded thickly on the stem just beneath the flowers, becoming opposite, all linear. This is a pretty species.

There are other varieties, such as *oxyptera*, *grandiflora*, &c., but the characters are so liable to variation, even on the same plant, that it is difficult to distinguish them without close inspection, but the above have generally constant characters. F.

THE DATE-PALM.

PHŒNIX DACTYLIFERA is the name given by Linnæus to this very important member of the vegetable kingdom. *Phœnix* is the Greek name of the date, and is probably derived from Phœnicia, whence the best dates were brought. Its origin, like that of so many of our cultivated fruits and vegetables, is unknown, but it may reasonably be supposed to be a native of Arabia and Persia. In very ancient times it was cultivated in Egypt (in the Museums of Economic Botany, Royal Gardens, Kew, is a specimen of "mummy bread" which is apparently made of dates, such bread being frequently found in jars in the tombs at Thebes) and in North Africa, from which countries it was introduced very long afterwards, probably by the Arabs, into South Europe. It is a noble tree, attaining under favourable conditions a height of from 60 to 100 feet. The stout stem, which is very rugged, owing to the persistent bases of the decayed leaves, is surmounted by a large head of feathery leaves, 12 to 20 feet long. The flowers are produced on large branches, which spring from the axils of the leaves. Each inflorescence is at first enclosed in what is called a spathe, which afterwards falls away. As many as 10,000 flowers have been counted in one spathe, and, as one tree will produce many spathes at a time, some idea of the total number of flowers may be obtained. Each tree bears flowers of one sex only; therefore cross fertilization is necessary. It is said that in times of war the Arabs cut down the male dates belonging to their enemies, the result being of course a total failure of the date crop. In "Hortus Collinsonianus," occurs the following memorandum :—"At Berlin was a large date-palm, at Leipsic was another, which was the male; both made attempts to produce fruit, but imperfect, as these trees are of different sexes, the Berlin tree being the female; anno 1749, they married the two trees by carrying a branch of male flowers and impregnating the Berlin tree; and then it produced good fruit, from which young trees have been raised, but this espousal must be done annually."

To the inhabitants of many countries the importance of the date-palm cannot be over-rated. The pulp of the fruit serves them and their various domestic animals for food; and even the extremely hard and apparently useless stones are ground and given to their camels. The young undeveloped leaves are eaten as a vegetable; in a mature stage they are made into bags, and are the sole material used in constructing the huts of the common people. The stalks of the leaves, when softened by boiling, serve as food for camels; and numbers are imported into this country for the manufacture of walking-sticks. From the stalks also, excellent baskets and crates are made. Timber for the houses of the better class is obtained from the stems, which also furnish an inferior kind of sago. The fibre, called "lif," from the bases of the old leaves, is converted into ropes and a sort of coarse cloth. The heads of trees not bearing freely are cut off, and the trunks scooped out. Into the hollows thus formed, the sap rises at the rate of from three to four quarts a day; this quantity is kept up for one or two weeks, after which it gradually diminishes: in six or eight weeks the trees become quite dry, and are used either as timber or firewood.

The syrup-like juice obtained as above described is turned into an intoxicating beverage by fermentation; and sugar is procured from this juice by mere boiling.

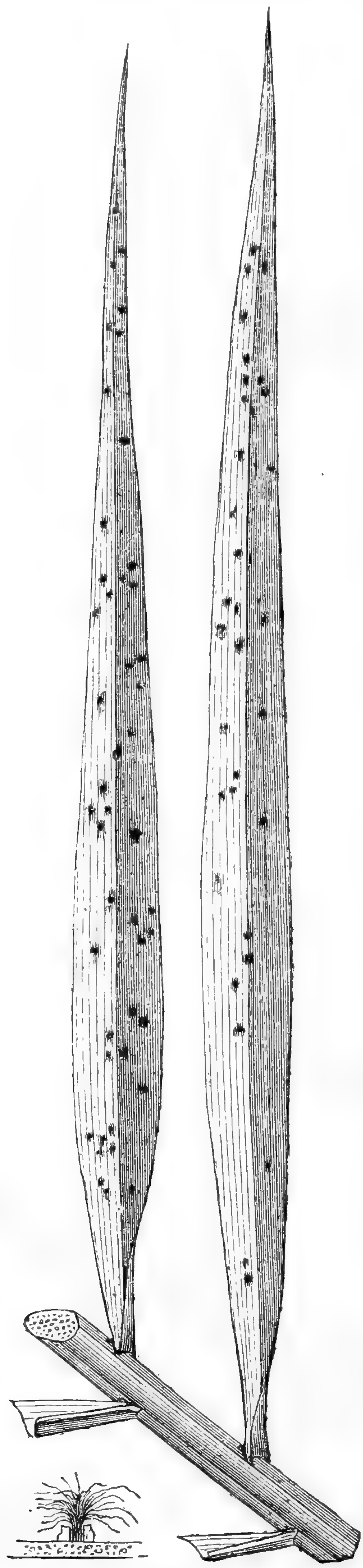

Fig. 84. Leaves of Date-Palm, covered with fungus (*Graphiola phœnicis*).

It is very probable that the palm-branches carried before Christ on His triumphal entry into Jerusalem were the leaves of this tree. Various branches of the Christian Church, by their use of date-palm leaves in decorating their churches on the anniversary of this event, and the Jews, by their use of them during the Passover, uphold this idea. For these purposes vast numbers of trees are cultivated, especially in the neighbourhood of Bordighiera, on the Sardinian coast. Collinson says, "Mr. Bowles writes me . . . the upper branches they tie up to turn yellow, and then sell them to adorn churches and houses to keep away the devil; they have the art of managing them."

Without the date the Sahara would be uninhabitable. In every spot where there is any water this tree flourishes, furnishing shelter to the traveller from the fierce tropical sun, and food for himself and camels. Very many varieties, differing much from each other in colour, size, and shape, are cultivated, each known by its own particular name. Some travellers mention as many as forty-six; and twenty-six distinct varieties are exhibited in the Kew Museum. The date is fast disappearing from the Holy Land, where at one time it seems to have been very abundant. Moses refers to Jericho as the "City of Palms," and we have the testimony of Pliny in his Natural History that palms abounded in Judea and the surrounding regions. On several of the coins of Titus, Domitian, and Trajan the country is represented by the symbol of a palm-tree.

Formerly dates were credited with many medicinal virtues. In some old herbals a decoction in red wine is recommended for the piles. The date's prevailing qualities are nutritious and saccharine. One pound of dates might produce about one ounce of the dry nitrogenous substance of muscle or flesh.

In conclusion, we may observe that the date-palm may be seen growing in many collections in this country, notably a very fine specimen in the large conservatory at Sion House, the residence of the Duke of Northumberland. In the Palm House at Kew there is a much smaller one with an abundance of a parasitical fungus on its leaves. This fungus, which bears the name of *Graphiola phœnicis*, and seems partial to *Phœnix dactylifera*, attacks several other species of the genus. GEO. NICHOLSON.

A LESSON FROM A FAGGOT-STICK.

THE object of this short paper is to show what pleasure may be derived by the observer of nature, from the contemplation of the most unlikely and commonplace objects, and how numerous are the sources from which instruction may be gathered to serve as a lesson in entomology.

Those who are happily acquainted with this part of Kent, to whatever county they may belong, and to whatever part of the world they have travelled, or may hereafter travel, will gladly confess that it

possesses points of beauty and interest which are not easily surpassed by those of any other county, and which entitle it to a place in the memory as a county of singular beauty, well deserving the appellation it has gained, "The Garden of England." Its graceful swelling hills are everywhere mantled with woods, sepia-tinted in winter, emerald-green in spring; fuller, deeper, and richer-hued in summer, and splashed with purple, gold, and bronze in autumn. It would, indeed, be difficult to say at what season of the year they are most attractive.

Fig. 86. Imago of *Hylisinus fraxini*, natural size.

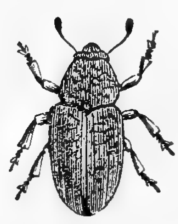

Fig. 87. ditto magnified.

Fig. 88. Larva of ditto.

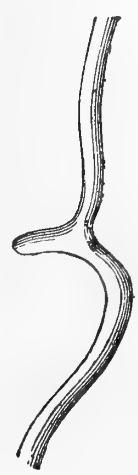

Fig. 85. Tracks of *Hylisinus fraxini*.

Fig. 89. General form of main track or channel.

Many of these woods are devoted to the growth of a kind of underwood for the sake of hop-poles, faggots, &c. They are allowed to grow for a period of about seven years, and are then cut down; the trees are lopped to within a foot or two from the ground. This frequently-repeated act of cutting down causes the stumps to assume the most fantastic and picturesque appearances. They are often decorated with an elegant drapery of clematis, ivy, black briony, briony, and other climbing plants, and the graceful polypody hangs its waving tufts from their wrinkled sides. Among the trees so grown may be enumerated the horn-bram, hazel, chestnut, ash, white-bram, oak, cherry, maple, &c., so that the woods present considerable variety to the wanderer. Beneath their shade grows a great selection of wild plants, decorating the earth as with a coloured carpet. During April these woods are gay with anemone, primrose, cardamine, two or three species of viola, and the golden pilewort; while a little searching discovers beautiful cushion-like masses of *Adoxa moschatellina*, the tropical-looking spurge-laurel, with its hanging clusters of yellow-green sweetly-scented bells. The curious, unhealthy-looking *Lathræa squamaria*, growing from the roots of the hazel, and other trees, upon which it is parasitic, trailing branches of ground-ivy, and the sweetly pretty *Oxalis acetosella*.

The faggots brought to our doors for lighting fires contain specimens of all the trees above mentioned, and many an interesting botanical lesson may be gathered from their examination. The nature of the bark, the formation and arrangement of the buds, the peculiar scars left by the falling leaves, and other points, may be well studied from these. When winter winds are howling round, and torrential rains are drenching the earth, we may well fly to the study of such objects as these for recreation and instruction.

About the end of the month of June I had occasion to hunt through one of these faggots in search of a stick for the amusement of one of my children. I picked up a straight branch of ash, which appeared just to suit my purpose, and commenced to cut and trim it. To my surprise, although looking perfectly fresh and sound, I found the bark almost completely separated from the wood below, and the space between the two filled with a fine sawdust-like powder. Fixing my attention a little more closely upon the twig, I now noticed that the bark appeared as if riddled with small shot, as shown in the upper part of fig. 85. On stripping the bark, and blowing away the dust alluded to, I detected a groove, originating below a leaf-scar, which, after passing under the scar, branched off in opposite directions, as seen in fig. 85. Springing from these grooves were now clearly discernible a great number of shallow channels, separated from each other by the merest film of wood; each channel widening out in proportion to its distance from the main groove. At the end of each of these branching channels I found a small, fat, active little grub busily engaged extending its passage, the wood forming its food. I now, of course, saw at a glance the meaning of all this loose dust and apparent rottenness, and the origin of these main and lateral canals. It appeared quite clear that the main ducts were made by some insect, that eggs were deposited at minute intervals, on both sides of these tracts, that these eggs were finally hatched out, that the grubs so resulting immediately commenced feeding, travelling continually away from the centre, and that as they waxed in stature they necessarily enlarged their tracts.

Having proceeded thus far in my discoveries, and

my interest being thoroughly aroused, I determined to prosecute my search. For this purpose a number of ash-branches were selected, and carefully laid on one side. A cursory glance at these showed nothing at all abnormal or noticeable, but a more careful examination disclosed a number of small ridges of discoloured skin traversing the branches in various directions. Taking off the bark at these points, the main passage before-mentioned was exposed to view. On tracing this up or down the stem it was always found to terminate below an old leaf-scar. Finding this, I now examined the leaf-scars, and in a majority of cases found a small hole filled below with fine dust. Detaching the skin at this point a small run was visible, passing just below the scar to the right or left; and when clear of it branching off in two opposite directions up and down the branch (fig. 89), but usually more or less spirally arranged. At the entrance to this passage was generally found a small beetle, and another some distance along. There were mostly two, but whether they were male and female, or whether they were both females acting in concert I was not able to determine. The diameter of the principal passage is about 1-16th in. The beetle I found to be *Hylisinus fraxini.*

It appears to be very prolific, and must be very destructive to the trees it attacks. In the cases I examined there were usually from 60 to 80 diverging passages, and at the end of each, as before-stated, was a fat larval beetle, busily engaged excavating for its daily rations. In many branches, almost every node was the starting-point for these channels, and the amount of mischief done to the tree may well be imagined when we bear in mind the numbers found in each run, and their method of working side by side so closely as to all but completely sever the bark from the wood. After examining a great number, a few specimens were put on one side for the purpose of watching their progress towards maturity.

On the 28th August the now-transformed larvæ began to emerge in the imago form, *i.e.*, as perfect winged beetles. They were pretty little insects, varying considerably in colour, some being much lighter than others, and most distinctly clouded. On raising the bark I found a great number still occupying their snug quarters, where they had fared so comfortably during their early days, and where they had undergone their final change preparatory to entering upon a more active and greatly extended sphere of action. I now found that, prior to undergoing their first metamorphosis, *i.e.*, assuming the pupa form, they sink for themselves, at the end of their respective galleries, a comparatively deep pit, in which the change takes place. In these pits they may be found in August ready to make their way out previous to setting up housekeeping on their own account.

Noel Humphreys gave an interesting account of these beetles in the pages of the "Intellectual Observer," in 1862. He there states that they attack the elm as well as the ash, and that their ravages are often terrible. The ash, however, is their favourite tree, as may be gathered from the specific name (*Fraxini*) of the insect.

Having thus learnt how numerous and destructive these insects are, and remembering that in a row of ash-trees that I passed daily some were flourishing grandly while others were dead or dying, I determined to ascertain whether these beetles had anything to do with the matter. On examining the dead and dying trees, I found them literally riddled with minute shot-like holes—the significance of which was now only too plain to me. I had often noticed the difference between these trees, whose conditions, as to soil, climate, &c., appeared to be identical, and wondered what could be the cause of the death of these, while those by their side grew vigorously. Had I noticed these holes a few weeks earlier, their meaning would have been hidden from me, but now, from the study of a few faggot-sticks I was able to understand most clearly what had been going on beneath the bark of these unfortunate trees, and why they had gradually, without any apparent cause, drooped and died, branch by branch and limb by limb, until a giant mass of mere dry sticks remained, rearing its weird and awe-inspiring form against the sky.

Thus, from the careful examination of a "faggot-stick" I gathered the life-history—or at all events the leading facts in the life-history—of a pretty little British beetle, which undoubtedly plays an important part in the "struggle for existence," which ultimately results in the "survival of the fittest," that has to compete in common with every other member of the organic world.

Rochester. JOHN HEPWORTH.

WHAT A DIATOM IS.

(*Continued from page* 107.)

IT is the act of generation that brings back the normal size of the frustule, already reduced in dimensions by repeated deduplications; if this did not take place, the diatom would (theoretically) at last become a mere atom—a circumstance which never takes place.

The act of generation, properly so called, may be said to consist in all organisms of a simple amalgamation of two more or less distinct particles of protoplasm. The diatoms are no exception to this rule, and with them this union comprises either the contents of two distinct frustules, or of differentiated protoplasm contained in a single frustule. This phenomenon is called the *conjugation* of the Diatomaceæ. The study of the phenomena of conjugation in some forty species of diatoms, by various distinguished microscopic observers, has not furnished us with such complete

results as we might desire, and the greatest circumspection is necessary in the interpretation of the facts observed. That which we appear to know for certain is that conjugation takes place in diatoms, and that the material result of this is the formation of what is called a *sporangium.* This proceeds either from the condensation of the protoplasm and endochrome contained in the interior of a single frustule, of which the valves are separated in such a manner as to enlarge the internal capacity of the frustule, the matter thus amassed giving place, according to the species, to the formation of one or two bodies, more or less round or oval; these very soon secrete on their surfaces a hard shell (*test-resistant*). These are the Sporangia, or the intimate union and fusion of the protoplasm of *two contiguous frustules* that have partially opened along the sections of the connectives for its liberation. Here also is formed, according to circumstances, one or two sporangia. When the sporangium [is produced by a single primitive frustule, it is probable that the original primordial utricle, which was already previously divided into two for the purpose of deduplication before the secretion of the new siliceous valves, and that the sporangium, formed of the differentiated protoplasm, produces that of the two young utricles. This, however, requires to be verified by direct observation. In both cases there is promptly developed in the interior of the sporangium a special body, which varies in form according to the genus, which grows rapidly, and which possesses an envelope rich in silica, and is able to resist calcination and the action of concentrated acids; it is often wrinkled across the external surface; this is the *Auxospore.* This last is the analogue of the zygospore of Zygnemaceæ. Its growth at last bursts the sporangium, and carries with it to its apices, the two halves of the sporangium-like little caps.

When the auxospore has attained a size generally double, or even more, of the frustule that has originally produced it, we discover in its interior, lying across the envelope, the valves forming the new frustule. These last are apparently the product of a true generative act, and which we are justified in considering for the moment as sexual, although our means of observation up to the present are much too imperfect to permit of our being able to distinguish the male from the female element in the products of conjugation. The first frustule is called the *sporangial frustule.* With this is destined to commence a new cycle of vegetative generations by deduplication, which continues up to the moment that a new conjugation takes place. It restores also the normal size of the frustules degenerated by the repeated deduplications, and we see here the singular phenomenon of the child being at its birth much larger than its parents. The sporangial frustule is always enormously large in comparison with its parents, the empty valves and connectives of which are generally retained by a mass of gelatinous matter secreted previous to the act of conjugation. We believe that other modes of reproduction exist in the diatomaceæ beside that of conjugation, but the biology of these little beings is much too imperfect to enable us to hazard any profound hypothesis on this subject. It is evident that all the frustules do not finish by conjugating; this is highly improbable, when we consider the rarity of that phenomenon. Some other explanation is necessary to account for the variations in the dimensions we meet with in the different individuals of the same series other than that of deduplication, as without it those frustules that escape conjugation would go on diminishing in size indefinitely, and we know from observation that every species of diatom possesses a maximum and minimum of dimension which it never passes.*

The rapid appearance of species where they did not previously exist—their periodic succession at determined seasons, and which we had never been able to find in the intervals in the same locality—this presents the possibility of a mode of generation which is only yet suspected, by germs, by micro or macro-zoospores, possibly even in the first case with the formation of zygozoospores, as it takes place among many of the inferior algæ who live under the same conditions as the diatoms.

We enter here a field of study of the greatest interest and novelty to every naturalist furnished with a good microscope, and possessing time and patience necessary for such researches, and we dare affirm that any member of a microscopical society who shall follow with care the entire life cycle of a single species of diatom, even the commonest, will probably render a greater service to science than if he had described and figured hundreds of frustules from the four quarters of the globe.

Note.—In a communication† to M. Deby, Professor H. L. Smith makes the following remarks:—

"I have received your brochure, entitled, 'Ce que c'est qu'une Diatomée,' for which I thank you. What you say is generally correct. I have myself published a part in the 'Lens' in 1873, but I entirely differ from you on certain points. The communication which you say exists between the internal protoplasmic substance and the external medium does not take place, as you say, along the sutures of the connective, but in the naviculus, properly so called; it exists along the raphe or median line, and in the Nitzschias and Surirellas along the alæ and carinæ. (This is an interesting confirmation of Ehrenberg's observations, who had also studied this phenomenon many years before J. D.) I possess drawings showing the injec-

* The process of self-division, no doubt, gradually exhausts the vigour of the sporangial frustule, but this power is possibly retained longer by some individuals than others (thus bearing a striking resemblance to parthenogenesis in the Aphides, &c.), but there is probably no fixed limit. I have seen much smaller valves of *Aulacodiscus Kittoni* in a New Zealand gathering than in a copious and pure gathering from Vera Cruz.—F. K.

† A translation into the French appears in the *Bulletin de la Societé Belge de microscopie* for Dec., 1877.

tion of indigo along the median line, and its penetration into the interior of the diatom, particularly in Stauroneis kept for some days in indigo water. Beside this demonstration, I was able, by the employment of the pigment, to obtain a glimpse of the mode of progression in the large Pinnularias. I am half tempted to send you my drawings. Many cases of conjugation are not always so simple as is generally supposed.

"When a large Pinnularia is observed in the field quite blue with indigo, we see in side-view (fig. 90) little particles of indigo running along the (X) raphe as far as the end of the median line; here they accumulate into a little ball, at C. In fig. 90, *a b*, a little ball is seen on each side, but that which is most surprising is, these balls revolve on their axes. When the ball acquires a little size it suddenly breaks, and the particles sail off in the direction *a e* (fig. 91), and a new ball is again formed; this is on supposition

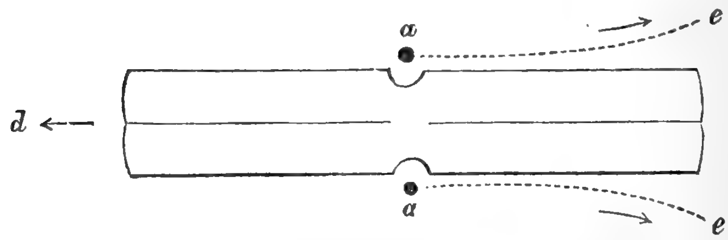

Fig. 90. Side view of *Pinnularia*, showing balls of Indigo running alongside.

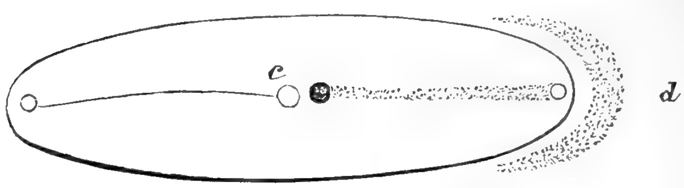

Fig. 91. Diatom, showing mode in which ball of Indigo breaks.

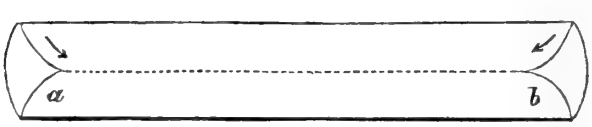

Fig. 92. Diatom in act of Deduplication at *a* and *b*.

that the frustule is moving in the direction of the arrow *d*. Moving the other way, the particles slip down the other half of the median line or raphe, and form a little ball, as before, at its end. I have watched this for hours, and I can assure you that it is a glorious sight. I had some magnificent large Pinnularias, and these effects were best seen when the motion forward of the frustule was prevented by its coming in contact with some particle of sand or dust. The colour in the field was the ordinary indigo-blue water colour, pretty thick. Furthermore, there always appeared a gelatinous envelope which prevented the actual contact of the indigo particles with the frustule, which, as it moved forward, pushed them in advance, as at *d* (fig. 90). The slightest application of aniline red (Fuchsine) demonstrates the external gelatinous covering by the absorption of the colour, even before the colour is seen elsewhere in the field, but this aniline instantly arrests all motion of the diatom.

"The act of deduplication of the primordial utricle is effected with great rapidity; it manifestly commences at the two ends of the frustule at the points *a* and *b* (fig. 92); the membrane there forms a fold, which is gradually prolonged until it reaches the central nucleolar mass; this occupies about six minutes from the commencement of the phenomenon.

"I have never been able to perceive a true circular nucleus in *Pinnularia major* (Ehr.), but it is very visible in divers species of navicula, such as *N. firma*, and in the Stauroneis. It is very manifest in the Surirellas. The frustules only separate from each other in seven days, rarely before. The conjugation in the Pinnularias continues for four days before the act is entirely completed. I have followed it step by step, and measured with a micrometer the sporangial development. . . . I remain, &c.,

"H. L. Smith."

(The above experiments are of great interest, and will, I hope, be repeated by other diatomists. The study of the living frustule has, I fear, been too much neglected for that of the dead valve, the diatomist having been seduced by the elegance of its contour and the beauty of its ornamentation. If, as Professor Smith describes, the communication with the interior of the frustule is through minute apertures at the termination of the raphe or median line, it is evident that those forms which do not possess this line, and are neither alate nor carinate, must possess some other means of communication; in the Aulacodisci this may be by means of the processes which are apparently perforate, but in the Triceratia, Coscinodisci, &c., I think M. Deby's suggestion, that it takes place at the margins of the connectives, is probably correct.—F. K.)

Those interested in the structure of the diatom frustule will find much valuable information in the papers of Dr. Wallich, particularly that published in the *Monthly Mic. Jour.*, Feb. 1, 1877. A paper by the same author, entitled "Are the Desmids and Diatoms simple Cells?" will be found in the April part of *Popular Science Review*, 1877.

A GLASS-EATING LICHEN.

On visiting an antiquarian friend, to whom I am indebted for the loan of specimens, &c., some old stained glass of about the fifteenth century was submitted to me, and an opinion asked as to the cause of certain irregular worm-eaten-looking holes of some depth, occurring generally only over one surface of the plates. My friend informed me that it was publicly discussed some twenty years ago as to its cause, for it had often been observed in old glass windows. At

first, on carelessly looking at it, it appeared to be explained by that disintegration which gives rise to those beautiful iridescent scales on old glass, and especially in the old black glass Dutch bottles, whose surface, on removing the scales, presented somewhat the appearance described. My friend informed me it was considered by some to have been made by the

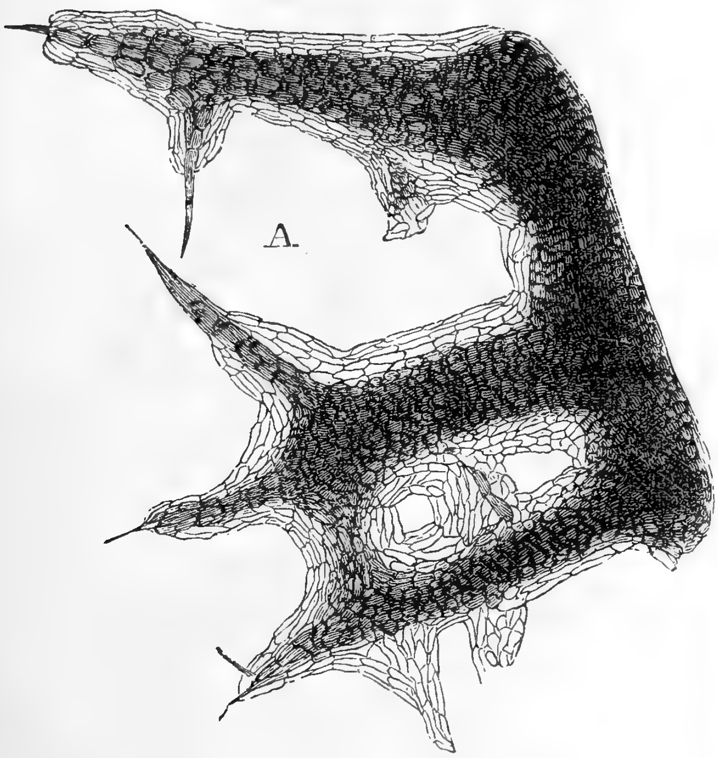

Fig. 93. Cellular Structure of Glass-eating Lichen (mag.). See fig. 94, at C.

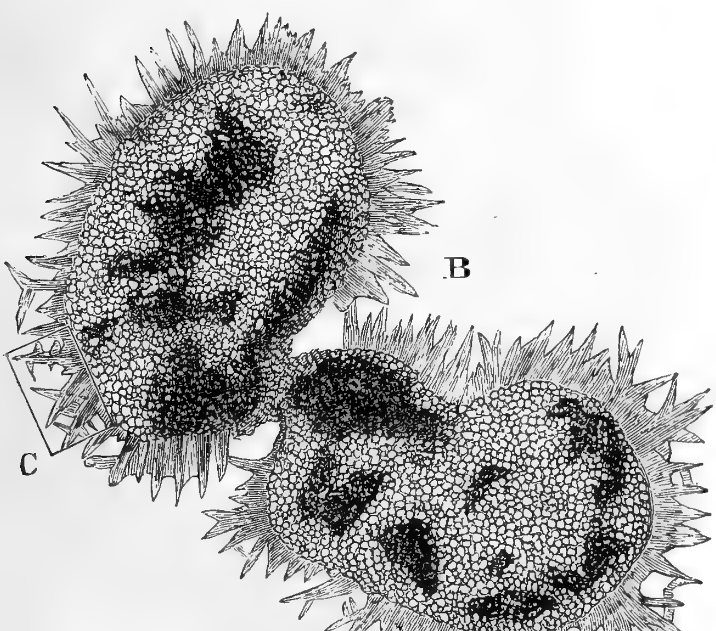

Fig. 94. Glass-eating Lichen (mag.).

workmen, to give a better effect to the light; but the irregularity sets that question at rest directly, though it stimulated me to look into the matter more carefully, and on a careful examination I was fully satisfied that each depression was occupied by a small lichen, such as we see covering grave-stones; at figure 95 is a portion seen by reflected light of the surface of some dark green glass twice its natural size, which shows the general arrangement. On submitting them to microscopical examination, to my delight, all the edges of these masses appeared to be spiked, and, although they had been in my friend's possession for thirty years, showed the cellular structure delineated in fig. A (Hartnack, ob. 7, oc. 2, tube drawn out), being the portion C of fig. B (Hartnack, ob. 4, oc. 4, tube in). I have shown them to two botanists, who are quite satisfied as to their nature; but they asked the question as to whether they might not be lichens which had occupied already existing holes; this, however, was capable of denial on the following grounds. It will be observed in fig. D that the bodies commenced to grow at certain points, but as they became larger they also became confluent, forming irregular masses with a serpiginous margin, to which the depression in the glass always corresponds; the central portion of each depression is level, and however large it may be, it is of the same depth, the steep edges

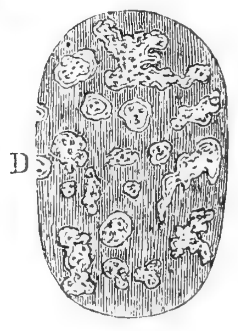

Fig. 95. Lichen as seen by reflected light on green glass.

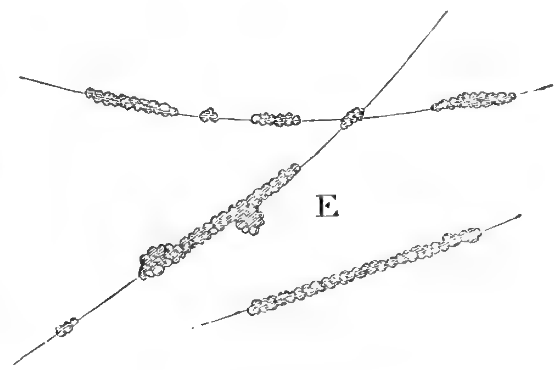

Fig. 96. Erosions running in nearly straight lines.

being occupied by the growing processes which seem alone to have the absorbing power; and lastly, on removing the growth by various re-agents, the exact figure of the points and even in some instances of the individual cells, are seen beautifully cut and embossed upon the glass. It occurs on the side opposite, and not on the painted side, which, in glazing, is placed on the inside of the window, and therefore would be unfavourable to the growth of these plants; neither does it occur round the edges, which are overlapped by the lead. One point was at first puzzling; these erosions sometimes appearing to run in straight lines, as seen in fig. E; it could, however, be demonstrated by a magnifying glass that it occurred along old scratches, the rough surface of which had afforded the most easy attachment for the spores and young plant. It is to my friend, Mr. T. Coates Archer, to whom I am indebted for the specimens, and also for a few notes as to their history. They are from the Church of Little Dunmow, in Essex (celebrated for the annual distribution of a flitch of bacon), from which it was removed by some glazier of Felsted, from whom my friend bought it, and has now had it over thirty years.

The remarks may at first appear to be of little interest, but in putting them forward it is with the hope that they will teach us to at least take precautions to protect or remove such an unpleasant enemy from some of the most beautiful works of art. H. T. JOHNSTON-LAVIS.

ON PREPARING AND MOUNTING LEAVES AND OTHER PARTS OF PLANTS TO SHOW THE CRYSTALS *IN SITU.*

By W. H. HAMMOND.

EVER since I first began to use the microscope Plant Crystals have been objects of interest to me, not only on account of their great beauty as "objects," especially with the polariscope, but also because they open a new and comparatively unexplored region of phytotomy; in fact, except in Professor Gulliver's writings, they are hardly mentioned, or very summarily dealt with by other botanical writers. At first I used to be content with a sight of them after boiling and mashing parts of plants, but I soon became dissatisfied with this method, and began to look about for some means of examining the crystals just as they grew in the different plants; fortunately I happened to look at a back number of SCIENCE-GOSSIP (January, 1875), and came across a paper by the late Dr. Beatty, "On Decolouring and Staining Vegetable Tissues for Microscopic Examination"; other papers, by Dr. Beatty, came out afterwards, and I gathered many valuable hints from them on the subject.

I am often asked how my preparations are made, so I will describe my process of preparing and mounting, for the benefit of other workers with the microscope who are interested in these beautiful, but much neglected, marvels.

The first thing to be done is to get the bleaching solution, and this may be very easily prepared as follows:—Equal weights (say four ounces) of chlorinated lime and common washing soda, both in fine powder, are put into a half-gallon bottle of cold water, and well shaken together, then left to stand till the fluid is quite clear, this is poured off gently into another bottle, and a strong solution of washing soda added as long as a white powder is thrown down. The mixture is again left till clear, and then poured off; this is the bleaching fluid. The original substances in the first bottle may be again treated with cold water. Leaves and other tissues are kept in this fluid till bleached and semi-transparent, large or thick leaves should be cut up into small pieces. I find the small, round night-light glasses, which may be bought for a penny each, are very convenient for bleaching the tissues in, and also for the dyeing and subsequent soakings, covering them over with pieces of glass to keep out the dust. It is not always convenient to prepare and mount leaves directly they are gathered, so I always carry with me a small account-book, interleaved with blotting paper, and with an elastic band round it; leaves are put into this when gathered, and by carrying it in the breast-pocket of the coat, they are soon dried by the warmth of the body; in the summer time several books full of leaves are collected, ready for the long winter evenings. Dried leaves will bleach sooner than fresh-gathered ones.

Having bleached some leaves (the time it takes to do this varying very much), they must be well washed in warm water in basins or pie-dishes, changing the water often for about two days, and brushing the tissues with soft camel-hair brushes. I often find it of use to put the plant tissues into acetic acid and water for about a minute before the final washing, but acids must be very cautiously used, or the crystals may be dissolved.

The leaves or tissues are then ready to go into either of the following dyes:—

The carmine dye is prepared partly according to Dr. Beales's formula, viz.:—

Carmine	20 grains.
Strong liquor ammoniæ ...	$\frac{1}{2}$ dram.
Pure water	4 ounces.

The carmine is heated in a test tube with the ammonia till dissolved, and then added to the water in a bottle and well shaken, and left to settle or be filtered. The dye should smell strongly ammoniacal. Sections are soon dyed in the above, but leaves take several days, or a week or more. Sections of the India-rubber plant leaf, or of the common fig, dyed in carmine, will show the stalked crystals, called cystoliths, very nicely; pieces of the leaves of the fig, hop, nettle, wall-pellitory, or wych elm, dyed, will show the cystoliths when viewed from above or below. I generally mount two leaves or pieces on the same slide, one with the superior and one with the inferior surface uppermost.

The logwood dye is prepared according to the prescription in Rutherford's "Histology."

A. Make a saturated solution of calcium chloride in 70 per cent. alcohol, and then add alum to saturation.

B. A saturated solution of alum in 70 per cent. alcohol.

C. Add A to B in the proportion of one to eight.

D. A barely alkaline saturated solution of logwood in water.

Add D to C till a deep violet-coloured dye is obtained.

I make D by boiling logwood chips with water and a very little potash, then filtering.

I generally use methylated spirit where alcohol is recommended.

The leaves and tissues may be immersed in either of the above dyes, straight from the last wash-water, and will be dyed in either in about the same time.

Tissues when dyed must be put into clean water, then, if dyed with carmine, into acetic acid and water for a minute; if dyed with logwood they must be put into alum and water, they must then be put into two changes of clean water and brushed with soft brushes. The remaining operations will be described further on.

I also use a blue dye made by pouring six or eight drops of Judson's aniline blue into an ounce of methylated spirit, shaking and filtering. Leaves and sections to be dyed in this must be soaked in methylated spirit for about a day after being taken out of the last wash-water. After dyeing they must be washed and brushed in methylated spirit. Leaves generally require to be kept in this dye for about a week. Leaves and sections after undergoing these operations may either be mounted in Deane's gelatine medium or in dammar or balsam dissolved in benzole. I like to have specimens of the same kind of leaves dyed in all three colours and mounted both ways, or only the blue-dyed ones mounted in balsam or dammar.

Leaves or sections, which are to be mounted in Deane's medium, should after the final washing, after dyeing, be put into the following solution as recommended by Mr. Deane, for two days:—

Rectified spirit	$1\frac{1}{2}$	ounces.
Pure water......................	$1\frac{1}{2}$	ounces.
Pure glycerine	5	drams.

Take the tissues out of the above fluid, drain off as much as possible and mount in the medium. I prefer this way of mounting for most leaves and other tissues, for this reason, it does not make them so very transparent as dammar or balsam does, and generally every cell-wall is distinctly seen, the crystals in the cells, the hairs, and every other part of the leaf.

Leaves to be mounted in dammar or balsam should be thoroughly dried from the last washing, after dyeing, this is best done by putting them into one of the before-mentioned interleaved books, and carrying in the pocket for a day or two. When thoroughly dry take them out and put them into a small wide-mouthed bottle, pour over them benzine enough to cover them, and cork up tightly till perfectly transparent. When ready to mount, take the leaves out of the benzine, drain, but do not dry them, and mount quickly in balsam or dammar dissolved in benzine (benzine collas is the best benzine to use). Leaves mounted in this way are beautiful objects for the micro-polariscope, if they contain crystals or have hairs upon them, but they are nearly always so transparent that the cell-walls are quite obliterated.

Good leaves to experiment upon, for sphæraphides, are Chickweed, Mercury, Wild Strawberry, and many of the Rosaceæ.

For long crystal prisms—the outer skin of the Gladiolus Bulb, Onion, Shalot, and Garlic.

For short prismatic crystals—Clover, Sanfoin, Beech, and Trefoil.

For true raphides—Squill Bulb, Hyacinth, Blue Bell, Lemna Trisulca, Balsams, Willow Herbs, Fuchsias, and Arums.

Cystoliths.—Leaves containing these should not be mounted in balsam or dammar, as they do not polarize, and are generally rendered quite invisible by this way of mounting.

No one need be afraid of not being able to procure specimens, for I believe the greater part of our plants contain crystals of one kind or other; they may be well and easily studied by mounting in Deane's medium after preparing and dyeing, they may also often be very well seen by simply bleaching, washing, and examining in water. And I may add that the crystals afford an abundance of beautiful materials for the microscope, and that the more they are studied the more they will be admired. Their taxonomic and physiological significance too, is an important subject for further research, concerning which, Professor Gulliver has given the results of extensive observations. He recommends boiling the plant tissues in a solution of caustic potash; this is an easy way of exposing some crystals and their cells, though by no means so effectual in the preparation of beautiful and instructive slides, as the methods which I have attempted to describe.

NOTES ON A DREDGING EXPEDITION.

BEFORE entering upon the subject of actual dredging, it would, perhaps, be as well to give a brief description of the little fishing-village which formed my head-quarters. Rossbeigh is a small watering-place on the east shore of Dingle Bay, in Kerry, Ireland. It is the property of the Hon. Rowland Winn, and consists of a few lodges, one of which, in the month of September last, I rented. About a mile away from these lodges are a few scattered fishermen's huts; and when the reader is informed that Rossbeigh is eight miles from the nearest town, and twenty from any railway station, he will understand that I had greatly to depend upon my own resources.

On looking at the map of this district, it will be noticed that there is a long spit of land running out towards a place called "Inch": this spit is over three miles in length, and is entirely composed of sand. From the signal-towers at the termination of this peninsula to a point called Feaklecally, an imaginary line may be drawn, and within this no great depth of water can, I believe, be found, for the following reason: Rossbeigh is situated on a mountain-side, a mountain whose base terminates upon the seashore; the soil at its foot is largely composed of a conglomerate, containing a great quantity of rounded

stones, and formed, in all likelihood, by the continual detrition of the mountain-streams. This soil, being so friable, falls an easy prey to the eroding influence of water, the sea having made considerable inroads into the land ; so much so, that a lodge which about thirty years ago was occupied by Lord Headley, is now entirely washed away; its site being utterly unrecognizable. Now the headland of Feaklecally checks any currents running up from the Atlantic, while the sandhills at Rossbeigh are another breakwater. Thus the bottom of the bay at this portion is shallow, and largely consists of the rounded boulders of the conglomerate. I have given this description in order to explain the kind of sea-bed I had to work pon. We will now proceed to the actual dredging.

The first requisite is of course the dredge and rope. The former of the two consists of a strong iron frame-

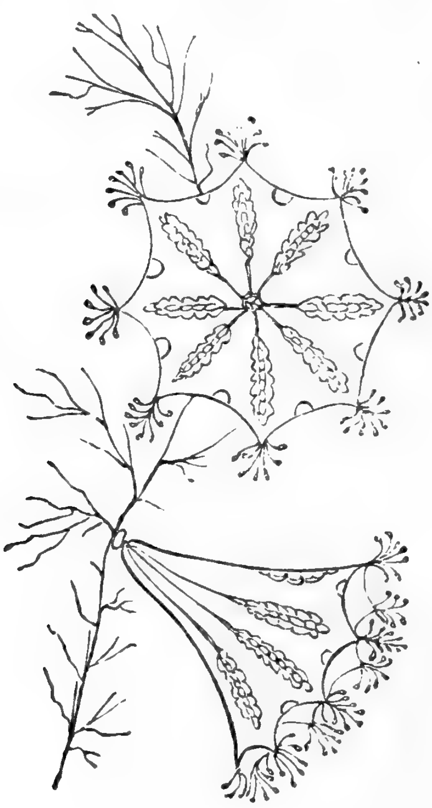

Fig. 97. *Lucernaria auricula.*

work (if galvanized the better) ; the scrapers are two in number, so that, no matter on which side the dredge may fall, it can work. The rope is made of good stout material, and ought to be "barked," which can be done in any tan-yard for a trifle. The rope is attached to the dredge in a somewhat peculiar manner ; the end is tied securely to only one of the attachment rings, and with a piece of spun yarn the other ring is whipped to its fellow ; so that, supposing the dredge to have anchored on a stone, and that it cannot be liberated by retracing ground, and thereby reversing the strain on the dredge, the boat is pulled rapidly until the spun yarn breaks ; then the dredge, being capsized, is freed easily. The next item is the boat : the heavier this is, within reason, the better.

In this I was, at the outset, unfortunate, as at first I could only obtain one of the Irish native canvas canoes, which, drawing but little water and keelless, would, on the smallest provocation, perform a rotatory motion, which would result in heading in a totally opposite direction to the one started from ; however, Mr. Winn very kindly had a small whaleboat belonging to him repaired for me, which served my purpose excellently. Across the boat, resting on each gunwale, I had a board fixed, as a support for the tray which received the contents of the dredge. This little detail is a very useful one, as it not only saves the trouble of stooping to examine the spoil, but also prevents the giddiness which often attends that position, and which is very frequently the herald of sea-sickness. Three sieves, of varying meshes, are also very useful ; one, a coarse mesh, of about half-inch diameter ; the second moderate, about one eighth-inch ; and the third of perforated zinc. Their use will be afterwards explained. Also a shallow box as a receptacle for the contents of the dredge, plenty of bottles, in which to store the

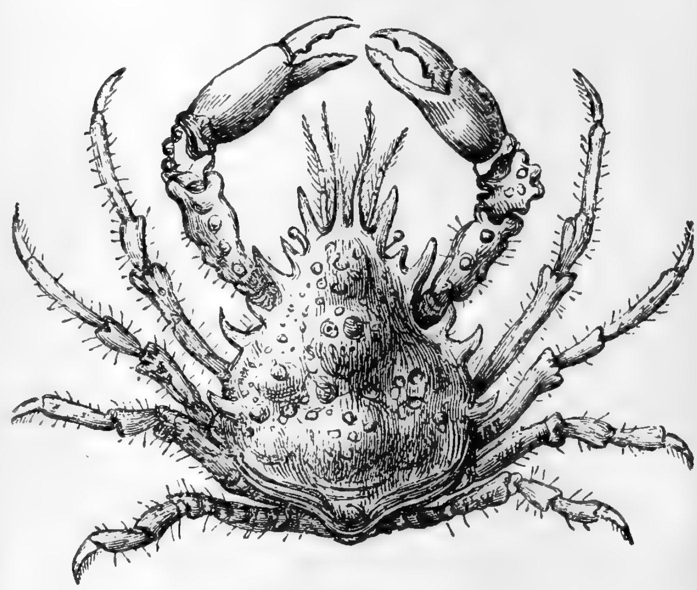

Fig. 98. *Pisa tetraodon.*

treasures, a gallon can of *fresh* water, a good strong pocket-knife, a *brass* forceps and a pocket-lens complete the equipment. The last I would recommend to be slung round the neck, so that it may be free, as it is neither an easy nor a clean task to be searching for it in the pocket with wet and often slimy hands. Now all being completed, dressed in your oldest clothes, and legs encased in mackintosh leggings, the boat is pulled out to the dredging-ground, and there the dredge is thrown overboard, near the stern, on the windward side, taking care that the rope runs freely. When it touches the bottom, the boat should be rapidly pulled until enough rope has been let out : roughly speaking, there should be twice as much rope out as the depth of the water dredged. When enough is paid out, a turn or two should be taken round a belaying-pin, and the inner end retained in one hand, while the other should clasp the part outside the boat, by which aid, the rope serving by its vibration as a kind of telephone, the working of the dredge

may be detected. If the dredge is jerking and bounding, the boat is being pulled too fast, whereas, on the other hand, too slow a progress causes the irons to sink too deeply; but when all is as it should be, the hand feels a gentle quivering, which proves the machine is working steadily. Do not, however, hold the rope too tightly, else, in the event of the dredge being suddenly anchored by a stone, you, in all probability, will collide rather unpleasantly with the side of the boat. Should the dredge get entangled, the best way to free it is to retrace ground, and, in most cases, it will free itself on being towed in an opposite direction; if that means fails, the rope must be strained until the spun yarn, already alluded to, breaks, when the dredge, being capsized, will easily free itself.

Supposing all to have gone on well, after half an hour the dredge may be lifted rapidly, but steadily, to the surface, taking care to lift it clear of the side of the boat, else you run the danger of crushing the crustacea and shells it may contain, and the contents emptied into sieve No. 1 (the coarsest). Large shells, stones, &c., are here retained, the smaller specimens successively passing into sieves Nos. 2 and 3, and finally the very minute forms find a resting-place in the tray. The process of sifting is greatly facilitated by washing the top mass.

My first day's dredging off Rossbeigh was about a mile from shore. This attempt was made from a native canoe, and from the little hold the craft had upon the water, the dredge could scarcely be got to work. The only benefit that accrued to me from that day's work was a rough knowledge of the depth of the water and the nature of sea-bottom, which, unfortunately, largely consisted of heavy, rounded stones. The next day's work was undertaken at low tide. The course chosen was further out to sea; but even at this distance from land (about 1½ mile from shore), where comparatively deep water might have been expected, the depth did not, I should judge, exceed 5 to 7 fathoms, the dredge coming up choked with *Rhodosperms* and other sea-weeds, mostly *Polysiphonia* and *Ptilota*. However, on emptying the dredge, a variety of marine animals were discovered, which, although not rare, were none the less curious. Two specimens of *Pisa tetraodon* rather obtrusively first made their appearance, and were followed soon by what very easily might have been mistaken for a lump of sea-weed, *Stenorhynchus phalangium*; several specimens of the Hermit Crab

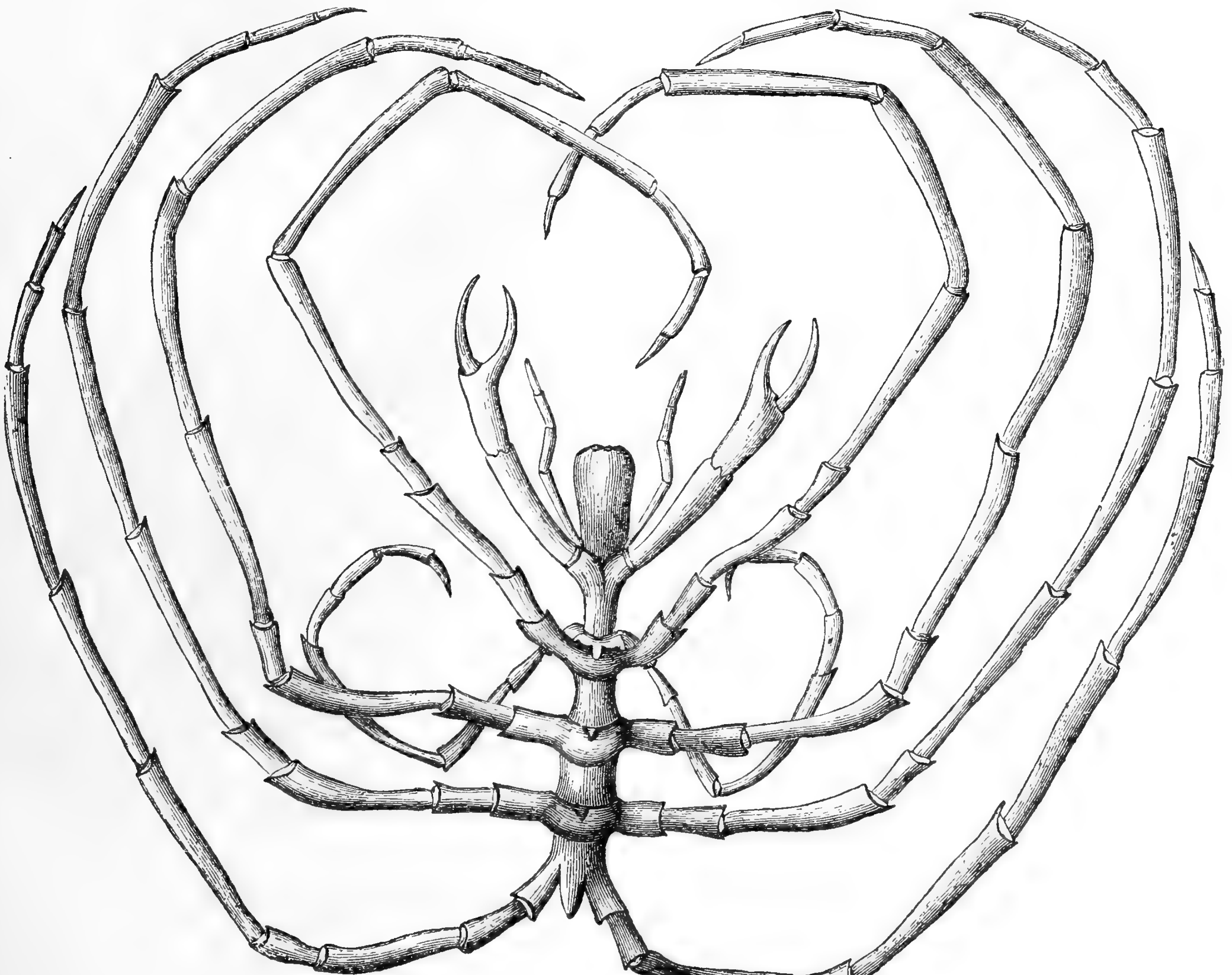

Fig. 99. *Nymphon gracilis.*

(*Pagurus Bernhardii*) were also inclosed. On more closely examining some of the sea-weed, I found several specimens of *Caprella linearis*, a most grotesque-looking animal, its movements very much resembling the walk of the looper caterpiller (Brimstone Moth), also a specimen of *Nymphon gracilis*, very few shells, and those very common ones.

On looking over the result the next day, I found a great quantity of foraminifera. I also found a few sponges and zoophytes: of the latter, *Laomedea geniculata* was the most common; also two specimens of *Lucernaria*, and, of course, any quantity of *Membranipora pilosa*.

The next day's work was undertaken in company with Dr. Battersby, who kindly gave me the benefit of his knowledge of this coast, of which he is a resident, and we judged it wiser to commence lower down the coast, off a small coast-guard station, called Kells; but although the water was considerably deeper and more sheltered, we found very little more to reward the trouble: a few shells, all dead and containing *Pagurus*, a dead specimen of the "shoulder of mutton" shell (*Aporrhais pes-pelicani*), and one living *Natica*. In the cavities of some of the roots of the Tangle (*Laminaria bulbosa*) brought up, a few specimens of *Patella pellucida* were found. We also obtained a few specimens of *Ophiocoma neglecta* and one of *O. rosula;* but on the whole, probably because of the sharp currents running along the coast, the conditions conducing to animal life were not very favourable.

Before concluding, perhaps a few words respecting the method of preserving specimens collected would not be out of place. The best methylated spirits of wine and ordinary sea-water mixed in the proportion of one part spirit to five water, is as good as any for the majority of forms. In first mixing, the spirit, owing to the resin in it, is apt to throw down a cloudy precipitate. This may be got rid of by adding to the mixture about an ounce of bicarbonate of soda to each quart, and filtering the whole through paper. Seaweeds may be simply spread out and dried. If it be wished to get the shells of foraminifera from sand dredged up, a good plan is to dry the sand thoroughly in a moderately warm oven, and when perfectly free from moisture, allow them to cool, and gently place the whole in a vessel of water, when the sand will sink to the bottom, whilst the foraminifera, containing air in their chambers, will float. The now separated foraminifera may be easily selected under a lens by simply picking them out with a camel-hair brush, to which they will adhere, if it be drawn through the lips: they may be afterwards mounted dry or in balsam. Before throwing any of the dredge contents overboard, it is a wise plan to place the seaweed, or at least the feathery forms, in fresh water, as unexpected discoveries are revealed by this means—minute forms, whose very existence was unsuspected, are compelled to declare themselves.

To briefly sum up, the dredger must have plenty of patience, must not mind wetting, evil smells, although on a sandy coast this is not very bad, and must trust as little as he possibly can to a boatman's assistance in sorting over his spoil, else half his treasures will be lost. A few good books for identifying his results are, I need not say, invaluable. The ones I have found very useful are Gosse's "Marine Zoology:" this will give the genera of the animal spoil, while "British Sea-weeds," by W. H. Harvey, will supply the botanical want. If, however, the latter is too expensive, there is a small shilling book by Mrs. Lane Clarke that is very useful. One, however, of the best general books, embracing a good deal, in fact, of nearly every class of sea plunder that the beginner is likely to come across, is "Half-hours at the Sea-side," by J. E. Taylor.

In conclusion, I can assure my readers that if any one of them care to devote his holiday to dredging, he will not only make a great acquisition to his marine knowledge, but also to his health; and I only wish that he may have as lovely surroundings in scenery as I had. H. A. FRANCIS.

HOW TO MAKE AN HERBARIUM.

A CHAPTER FOR YOUNG COLLECTORS.

By JOHN W. BUCK, B.Sc.

As the summer advances doubtless many young lovers of nature will begin again gathering wild-flowers, and bringing them home in nosegays, as they have often done before, to be looked at for an hour or two and then, when withered, thrown away. Some may have tried ere this to dry them, and so to keep a record of their industry and their love for flowers, but may not have succeeded to their own satisfaction for want of a little help or instruction to begin with. It is for such that I intend this paper. To make an herbarium may sound a very imposing task, but such it need not be, for it can be done slowly and gradually—a plant at a time, if need be—and the flowers, when thoroughly dried and mounted, if taken care of will keep an indefinite time and be a lasting source of enjoyment. Nothing is so conducive to a knowledge of our British wild-flowers as to make as complete a collection as possible of them; although those who take my advice and make the attempt will probably be surprised to find how few flowers they already know, and how many there are hidden away under the hedges or in the woods which they never saw before. An object such as this gives a new zest to our country walks, besides making us find out new ones; gives us pleasant associations with particular spots as being the places where we first found such and such a new flower, fern, or moss; and above all gives us new and brightened views of nature and of nature's God.

To collect flowers for an herbarium, all that is necessary is a tin box and a trowel, though some collectors prefer to carry a portfolio containing porous paper and to put the plant under pressure on the spot. This has the advantage of securing that the flower shall lose none of its freshness while being carried home; but it is a cumbrous and troublesome plan, and it will probably be found, in the case of most flowers, that if they are brought home in a biscuit-tin, and the roots perhaps placed in water to freshen them up if necessary before pressing, that they will appear as good as need be. It will nevertheless be found very convenient to carry a small pocket-book with some porous-paper leaves, in which to preserve at once some blossoms which will require it. For instance, it will be found impossible to bring home an entire Dandelion or Bindweed without the blossom closing up; and the corolla of the Germander Speedwell, the bright little blue flower often called Bird's-eye or Cat's-eye, that looks so pretty and lasts so long in the summer hedgerows, will almost certainly be knocked off before the plant can be pressed at home. In such cases these parts must be put under pressure separately from the rest of the plant, and at once. Indeed, such a sleepy plant as the Tragopogon, or John-go-to-bed-at-noon, almost requires to be caught with guile. Go in the morning when it is open and press the blossom in the porous-paper book before detaching it from the stalk. Some entire plants, from their delicate and brittle nature, had better be pressed on the spot; as, for instance, the pale-green Moschatel, the stalks of which are almost sure to snap with the slightest rough usage. Of course, when the roots have to be cleared from much earth, especially if the earth is of a clayey nature, it is absolutely necessary to bring the plant home before doing anything with it. On the whole, the tin box will be found preferable to the portfolio, and the occasions on which the latter must be used will soon be learnt by experience. Better than either, because more convenient, is the regulation vasculum, of japanned tin.

For digging up the plants, since in most cases the roots must be preserved, a trowel is generally recommended. After a few of these have been broken by rough usage in stiff soils, or spoilt by friends who have borrowed them "just for once," they will probably be replaced by a small three-pronged fork, about the same size as the trowel, but much more durable. Even this, however, has its disadvantage, which will be found out on trial. In selecting the specimens for preservation, a little discrimination should be exercised. It is best, perhaps, to take two plants of the same kind and dry both, and afterwards choose the best of the two for mounting. It is not advisable to take more, unless they are somewhat inaccessible, or unless, for other reasons, it should be difficult afterwards to obtain more if required, as a large number only fills up the box, takes up a great deal of room in the press, and gives much unnecessary trouble in many ways. Choose, therefore, two plants which are fairly developed, and which show, if possible, specimens of all the kinds of leaves the plant may possess, which have some blossoms fully open and others in bud, and, in short, which are in all respects good specimens of their kind. In some cases the leaves are not up when the flower is open, as with the Yellow Coltsfoot, which flowers in the early spring, but whose leaves are not to be found until much later. It is a mistake to choose too large a plant, under the impression that it will look well; a medium should be aimed at in this matter, as in everything else. Perhaps it is not unnecessary to say that rare plants ought not to be exterminated. Persons who go about hunting for rarities, and who take all they can lay their hands on, are collectors *only*, not botanists. Many of our uncommon ferns are daily becoming rarer, and harder to be found by those who really want to study them, because they are so diligently sought after and dug up by collectors who only want them to sell. My advice is, if you find a rarity, take of it in moderation, and then, in the interests of science, keep your own counsel as to its whereabouts.

In removing a plant, care must be taken not to spoil the root, nor to injure the leaves that spring from near the ground. It is often of great importance that these latter should be kept intact, as they frequently differ from the leaves which grow higher up the stem, and are very useful in assisting to determine the name of the species. With many plants, as is the case with the Coltsfoot, the root will be almost sure to break off sooner or later. Again, a complete Bluebell, bulb and all entire, will be a very good certificate of perseverance for its possessor. The adhering earth should be shaken off as far as possible without doing injury to the roots, and the rest carefully pulled off at home, or removed by holding the root (only) under a stream of water.

The next thing ought to be to name the specimen; and if I could take for granted a little knowledge of botany on the part of my readers, it would not be very difficult to show in brief the easiest method of arriving at the correct botanical and popular names of most of our common wild-flowers. For those, however, who know nothing of botany, the best way is to compare the flowers brought home with the illustrations in some such work as Ann Pratt's "Wild-Flowers," or John's "Flowers of the Field," or Sowerby's "English Botany," or to obtain the help of some botanical friend. At all events, you need not despair of making good progress with your herbarium, even if you do not know the names of all the plants it contains, as these can generally be added afterwards.

In any case, proceed to dry your plants before they lose their freshness. This is accomplished by pressing them between porous paper. The best paper for the purpose is, or used to be, made by

Messrs. Spicer, of New Bridge-street, Blackfriars (who also supply white paper for mounting, in sheets about 17 in. by 11 in.), but in default of this, thick blotting-paper is said to answer, though I have not tried it. The plants must not be damp when they are put in the press, and if the roots have been washed to clean them, they should be wiped as dry as possible. If for any reason the plants are at all damp, the papers should be changed very frequently at first, even twice a day, until the excess of moisture has been removed. I am frequently asked, "How is it you manage to keep the colours of your flowers so well?" Mainly by attention to this point—by not allowing the flowers to remain damp. Otherwise they are very apt to change their colour; as, for example, the Wood Anemone, or Windflower, which generally turns brown, but which may be kept white with proper care. Heaths and firs are said to require a dip in boiling water before drying, in order to prevent the foliage from falling off. The same process prevents succulents, such as the curious flesh-coloured parasitic Toothwort, from growing during or after pressure, by killing them at once. Here, also, the superfluous moisture should be removed by a handkerchief before pressing. Do not mix fresh specimens with dry ones, but separate them with several sheets of brown paper. Laying the plants out will often be found a troublesome process, and one which, in order to do it well, will in some cases require time and patience, but it is not of much use to give advice on this head, except to say that the various parts of the flower should be as well exhibited as possible. For instance, where the flower has a coloured calyx and no corolla, as in Marsh Marigold, Clematis, and Wood Anemone, one blossom should be folded up so as to show the absence of the customary row of green leaves below the coloured ones. Or the same subject may be effected by completely reversing one blossom, so that its face is towards the paper. Where bracts, or small leaflets at the base of the flower-stalks occur, as in orchids, they should be shown. The specimens should be distributed among the sheets of porous paper in such a way that the pressure may be somewhat equal in all places; but those plants, however, are likely to dry more quickly which are nearer the margin of the sheets. Thick stems had better be sliced in half longitudinally, as it prevents their taking up too much room, and also enables them to dry very much faster. The same course may be taken with thick roots or root-stocks, as in Primrose and Coltsfoot; but in such cases care must be taken to leave enough root-fibres adhering to the main axis. Bulbs and corms, and the fleshy tuberous roots of orchids may also be sliced; some recommend scooping out the inside, but this is apt to make them break and spoil under pressure. Berries and stems that are not thick enough to slice may be repeatedly pricked on their under surface, or slashed with the point of a penknife, to let out the moisture. A very good plan with fleshy berries, and thick stems and roots, is to dry them, apart from the rest of the plant, by pressing them between several folds of porous paper, and baking the whole for three-quarters of an hour in an oven. But this does not always answer, and should not be tried with green leaves, as it is apt to turn them brown. In short, the more rapid the drying process the better; and hence the necessity of having recourse to these contrivances in order that the colours of the blossoms may not be injured through being kept damp by the slow drying of the thicker parts.

(To be continued.)

MICROSCOPY.

"CUTTING IT FINE."—At the usual conversazione which followed the ordinary meeting of the Quekett Microscopical Club on April 26th, Mr. E. T. Newton exhibited thirty-three sections of the head of *one* cockroach!—*Blatta Orientalis.*

FOSSIL DIATOMACEÆ.—The Diatomaceæ in the Cementstein are described and figured (very beautifully) by Dr. Heiberg, in his "Kritisoversigt over de Danske Diatomeer." The richest in diatoms is the Cementstein from the island of Mors, situated in the Liimfjord, lat. 56° 50′ N., long. 8° 40′ W. This fjord is the largest in Jutland, and runs from east to west, connecting the North Sea with the Kattegat. The material is also known as "Jutland slate." A similar deposit occurs in Fuur; it is less affected by acid, and bears considerable resemblance to the deposit known as "Brown coal." Another deposit is found at Nykjobing, a village on the western side of the island of Mors. This is much more difficult to prepare, neither acid nor alkali making much impression upon it. The following forms have been described and figured by Dr. Heiberg in his treatise, and by myself in the "Journal of the Quekett Microscopical Club," in the Parts for 1870 and 1871. The following are the most abundant forms in the Mors deposit:—*Trinacria regina*, Heiberg; *T. excavata* = *Triceratium solenoceros*, Ehr = *T. Kittonianum*, Greville; *Trinacria Heibergia*, Kitton; *Do. var.*, Kitton; *Triceratium maculatum*, Kitton; *Solium exsculptum*, Heiberg; *Corinna elegans*, Heiberg; *Stictodiscus angulatus*, Grunow; *Stephanogonia Danica*, Grunow; *Trochoseira mirabilis*, Kitton; *T. spinosa*, Kitton; *Hemiaulus proteus*, Heiberg; *H. hostilis*, Heiberg; *H. februatus*, Heiberg; *Do.* (q. sp.), Kitton; *Coscinodiscus stellatus*, Roper; *C. radiatus*, Ehr; *C. oculus Iridis*, Ehr; *Stephanopyxis* (qu. sp.); *Aulacodiscus Jutlandicus*, Kitton. Triceratia occur in the Barbadoes, Californian, and Morsa deposits, as well as in the Virginian "earths."—*F. Kitton, Norwich.*

AQUARIA FOR MICROSCOPIC WORK.—In answer to W. D. B., I would suggest that I find several small aquaria (none of them holding more than a quart)

much better for microscopic work than a large one, for we can hold one up to the light with one hand and use the dipping-tube with the other. We are able to keep a better and more varied assortment, and the depth is better for dipping. Anatomical specimen-jars and beakers I find to be most convenient, but wide-mouthed bottles may be substituted on account of cheapness. I have usually about thirty in use, some of them being very small, and I never find it necessary to change the water. Covers of muslin, cardboard, paper, or glass can be used. Among the plants I find to be useful are *Elodea canadensia*, species of *Chara*, *Callitriche verna*, *Scapania undulata*, *Pilularia globulifera*, *Montia fontana*, and species of bog and water *Hypna*.—*Wm. West, Bradford.*

Small Aquarium for Microscopic Objects.—It is likely that W. D. B. may have some difficulty in finding his animalculæ, &c., if he should put them into a tank of thirty inches length and proportionate depth and breadth. I recommend him to make much smaller ones upon the following plan:—buy at the grocers some of the empty tin boxes which have held between two and three pounds of Huntley & Palmer's Water Biscuits (mind, *Water*), cut out the ends and sides, leaving a framework sufficient to support the glass, and you have at once the skeleton of a handy and well-proportioned tank. Cement the glass with a mixture of red and white lead, let it set for two or three days, then fill the tank with water and let it remain for a week, so that the taint of the lead may be removed; empty out, put a layer of well-washed Calais sand at the bottom, and the tank is ready. Mount it upon a slab of wood, and put four slips of thin wood to retain it in position. The tin frame should have two coats of paint or Brunswick black. I prefer the latter.—*A. P. W.*

Canada Balsam in India.—Will slides mounted in balsam stand the heat of India? Would it be sufficient to surround the cover with some heat-resisting cement? If balsam will not do, what other medium will?—*H. F. Blackett.*

The Hackney Microscopical Society.—This society, which specially devotes itself to the study of microscopy and natural history, has just issued its first annual report. We are glad to see abundant signs of vigorous health, although the society is only a year old. The president is Mr. H. Ramsden, M.A., F.L.S.; and the hon. secretary, Mr. Collis Willmott. The list of members is numerous, and includes many names well known in science. Papers on various natural history subjects, chiefly entomological, have been read, and five field excursions made during the summer. The foundation of a good natural history library has also been laid, and with such a start we shall look forward with interest to the progress of the society during its second year.

ZOOLOGY.

The Uraniidæ.—At a recent meeting of the Zoological Society, Professor Westwood communicated a memoir on the *Uraniidæ*, a family of Lepidopterous insects, with a synopsis of the family, and a monograph of one of the genera, *Coronidia*. These insects were remarkable for their extreme beauty, and the difficulty which had attended their systematic classification. Their relations with other groups of Lepidopterous insects were discussed at considerable length, and their numerous affinities were shown to be with certain other moths belonging to the great division of the Bombyces, whilst their connection with the Hesperian butterflies, the Pseudo-sphinges, Erebideous Noctæ and Ourapterygeous Geometræ was disproved by their general structure, the venation of their wings, and their transformations. A synopsis of the species of all the genera was given, and a complete monograph with figures of the genus *Coronidia*.

The Brachiopoda of the Atlantic.—At the same meeting Mr. Gwyn Jeffreys, F.R.S., F.Z.S., read a paper on the above subject. The areas from which the Brachiopoda were obtained were restricted to portions of the North Atlantic, including the Mediterranean. A table of all the Brachiopods known to inhabit the European seas was given, comprising ten genera and twenty-two species, of which latter four were for the first time described, and six figured. The table also particularized the geological and bathymetrical range of all the species. Two plates accompanied the paper, and were furnished by Mr. Davidson.

Mimicry in Birds.—Mr. J. Young writes to *Nature* to say that in a tract of land on the coast of Kent called Reculver Marsh, the place is much frequented by skylarks and plovers, and that almost all the larks have incorporated the well-known alarm-note of the plover into their song. Professor Newton remarks that this fact has already attracted notice; for at Thetford, in Norfolk, where the ringed plover is common, skylarks often mimic its peculiar cry. Starlings are said to have acquired the cries of various kinds of birds, notably those of the plover and swallow. Jays are also stated to imitate the note of the carrion-crow.

The Nightingale in Derbyshire.—Pray let me note to you, and through Science-Gossip to others, the pleasing fact that a nightingale has made its appearance here, and has been nightly for the past week (and is still) singing its sweet song close to this village. It is but seldom that the nightingale visits Derbyshire at all, and this is the first time, so far as my knowledge goes, of its ever having come so far north in our county as Winster, which, as you are aware, is in the Peak district. It will be well, with your permission, to make known this visit through Science-Gossip.—*Llewellynn Jewitt, F.S.A., &c.*

DEVELOPMENT OF PROTEUS ANGUINUS.—Professor Schulze has recently discovered the mode of development of this blind amphibian. He found a specimen in the Adelsberg cave which had laid fifty-six eggs. The *Proteus* is proved, by researches on the ovary of a female from which the eggs were taken, to be oviparous.

THE CUMBERLAND ASSOCIATION FOR THE ADVANCEMENT OF LITERATURE AND SCIENCE.—A capital plan is in successful action in Cumberland, whereby scientific societies in six of the chief towns are affiliated into the above association. The annual gathering was held in Cockermouth in Easter week; when Mr. Isaac Fletcher, M.P., gave the presidential address. Afterwards, Sir George Airy, the Astronomer-Royal, delivered what he said would most probably be his *last* lecture, on "The Interior of the Earth." Mr. J. Clifton Ward, F.G.S., the hon. secretary, read a valuable paper on "Quartz in the Lake District." Various other papers were read.

THE NORTHAMPTON NATURAL HISTORY SOCIETY have issued their second report, which shows a numerical increase in members, and a uniform success in all their efforts. The meetings have been held monthly, at all of which papers have been read. A list of the Lepidoptera of the county is being prepared by the President of the Entomological Section, Mr. A. Perry. The President of the Socie ty is the Right Hon. Lord Lilford, and the Hon. Sec. Mr. G. C. Druce.

EARLY APPEARANCE OF COLIAS EDUSA.—Mr. W. H. Liversedge saw three specimens of *Colias edusa*, on Monday, April 22, while driving near Ryde, Isle of Wight. They were strong on the wing, as if freshly emerged, or they may have hybernated in the imago.

NEW BRITISH CRUSTACEA.—Mr. Spence Bate has described two new species of small Crustacea, found by Mr. Sims of Aberdeen. One species belongs to the *Diastylidæ*, and the other to the *Amphipoda*. The former has been named *Diastylis bimarginatus*, and the latter *Lestrigonus spinidorsalis*.

SALMON DISEASE.—Mr. Worthington Smith describes and figures the disease which this spring has destroyed such numbers of salmon in the Eden and other rivers. It is the result of the growth of a fungus, *Saprolegnia ferox*, in enormous quantities; and Mr. Smith thinks the unusually vigorous growth may be due to the mildness of the past winter.

BOTANY.

SUMMER LADY'S TRESSES (*Spiranthes æstivalis*).—I am quite sure all botanists will deeply regret to learn that this rare plant—which, like *Gladiolus illyricus* and *Pulmonaria angustifolia*, is to be seen nowhere in England but in the New Forest—is being rapidly cleared out of its station near the Lyndhurst and Christchurch Road. I have reason to fear that in two years not a single specimen will be found in the famous Spiranthes bog. This is deplorable—and I must explain how this much-to-be-deprecated eradication is being effected. The year before last a second edition of the "New Forest Handbook" was brought out, comprising, among other additions, a short paper on the botany of the district, and in this the author thought fit to describe, with almost painful minuteness, the exact locality of the bog. This, no doubt, was kindly meant, but the consequences are lamentable, as I shall presently show. In the vicinity of Lyndhurst, and in many other parts of the Forest, there are resident "collectors," who collect insects (chiefly *Lepidoptera*), birds' eggs, rare ferns, and anything else which is marketable, and dispose of them either to London dealers or to visitors. Now, when the handbook appeared containing the notice of *Spiranthes æstivalis*, and referring to it as "a plant quite peculiar to the New Forest, and to be found in no other spot in England," they saw at once a rare opportunity for increasing their returns; since, by carefully pulling up every plant they could find, they would hold the monopoly, and always be sure of a ready and certain sale. This was made more apparent when large numbers of visitors flocked to the bog last year, even as early as May, and when orders for specimens came in from all parts of the kingdom. Their anxiety to discover the plant as early as possible was very great, and on more than one occasion I have been asked what it looked like, and how they might know it, for a plant a few inches high, with a lax spike of small white flowers, growing in a very wet sphagnum bog, is not very likely to attract much attention. In the month of August I called at one of the cottages close by and inquired about the *Spiranthes*. I was told that the day previously it had been found by a visitor. "So," continued my informant, "as we have so many people asking about them, and so many orders, we went out last night and this morning and brought in every plant that was in blossom. I'll show you them," and—shall I say it?—to my intense disgust a large earthenware pan, about two feet in diameter, was brought out *completely filled with Spiranthes æstivalis*—roots, flowers, and all! Besides this there was on the table a good handful of cut blossoms. I said I would walk over the bog and see if there were any more, which called forth the remark: "I don't think it's of any use, Sir; I don't think there's one left." However, I searched, and after wading half-knee-deep in water for an hour or so, succeeded in finding three specimens, two of which I took, and afterwards reproached myself for leaving the third; for I felt sure it would be gone next day. I have not visited the cottage since, but I have no doubt that every visible specimen was ruthlessly

pulled up. The only chance was for young plants which did not blossom—these of course are bound to go this year; next year the last lingering vestiges will be swept away, and *Spiranthes æstivalis* shall never again flourish at its celebrated station in the New Forest of Hampshire. Nothing can save it. Other bogs will, when this one is exhausted, be searched, and if, as is said, the *Spiranthes* occurs elsewhere in the neighbourhood, it will soon be a thing of the past, and one of the very rarest plants in the United Kingdom will be extinct, unless specimens are procured from the Channel Islands and planted. Can anything be done to prevent its complete extirpation? I do not for a moment blame the cottagers; if a wild plant will fetch a given number of shillings in the market, these people have, undoubtedly, as great a right to sell them as have more wealthy collectors to travel a long distance in order to gather them for themselves. The plants do not belong to anybody in particular, and the cottagers may as well make money out of them as by the sale of a *Vanessa antiopa*, a Montagu's Harrier, or a nest of raven's or honey-buzzard's eggs. The error lies in making the habitat of a rare plant publicly known. When will kind-hearted botanists learn that it is a grand mistake to publish the exact habitat of a rare or local species? It is disheartening enough to know that a plant is gradually becoming more and more scarce in a district, yet it is some consolation to know that it grows in other parts; but what must be the feeling of all right-minded botanists on learning that the only spot in the kingdom in which a species flourishes is being rapidly and surely shorn of its glory? *Spiranthes æstivalis*, compared with other orchids, has but small pretensions to beauty, and is far from being a conspicuous plant; and growing in the very wettest part of a peat bog, might have escaped destruction, and continued to flourish for many long years to come. The (perhaps) well-intentioned, but most injudicious, publication of half-a-dozen lines will, in all probability, be the means of extirpating it, and robbing the British flora of one of its brightest gems.—*E. D. Marquand, Brockenhurst.*

OROBANCHE ON BEGONIA.—We have in our greenhouse an *Orobanche* that has arisen from the roots of a Begonia. In the field close to the house every year we have many *Orobanche minor*, arising, we presume, from the roots of clover. We therefore thought that it might be this plant, but from the description, which I send you, you will see it is not. Sepal with no vein, or if with one vein, very indistinct; ovate below, narrowed into one subulate point shorter than the tube of the corolla; corolla tubular arcuate; lips denticulate, wavy; lobes of the lower lip nearly equal, middle one largest; upper lip emarginate, sides patent. Stamens inserted near to the base of the corolla tube, slightly pilose, anthers dark brown. Stigma approximately two-lobed, pale red. Bract one. Leaves none. Stem purplish, four inches high.—*T. J. Edwards.*

LOOK AT THE HEDGEROWS DURING JUNE.—Mr. Hobkirk some few years since, in the pages of the "Naturalist," gave us an admirable article on the sub-species of the Hawthorn; until then they appeared to be overlooked by British botanists, or they merely regarded them as a single species. For several years they have furnished to us matter for thought and study, so that now we can generally when riding rapidly along the lanes point out any of the species, or varieties, when in flower. What we particularly wish, in fact our object in drawing the attention of our readers to them, is to ascertain their distribution. For the present, and as the space at our command must be limited, we describe only two of the species, probably both will be discovered in many counties:—1. *Cratægus oxyacanthoides, Thuil*, may be recognised with ease, by having from two to three carpels, and the peduncles and calyx tube being glabrous or smooth.—2. *Cratægus monogyna, Jacq.* Carpel solitary, peduncles and calyx pubescent (clothed with fine down). The leaves are large, and deeply lobed. *No.* 2 is our common species in the North of England, *No.* 1 more rare.—*F.*

FERTILIZATION OF MERGENIA ERECTA.—At a recent meeting of the Linnæan Society, Mr. R. I. Lynch read a paper on the mechanism for the fertilization of the above plant. It is a West African Acanthaceous shrub, bearing funnel-shaped corollas, with hairy anthers midway in the tube, their backs pressed against the wall. The lower slender flexible style has its double-lipped stigma so formed and placed, that insects alighting and entering towards the nectar at the bottom of the flower, on their return so move the lever-lip of the stigma as to produce pollenization.

POSITION OF THE PASQUE FLOWER.—I have noticed that whenever I have found the *Anemone Pulsatilla* it has always grown in belts of a certain altitude, as for instance: last year on the Blewberry Downs I found the above specimen; it was growing in a belt at about 40 feet elevation, and the belt only being about 25 or 30 feet broad. I was rather surprised at this, and determined to take notice this year; I have done so, and again noticed the same peculiarity. I have never found *one* out of the belt. I have consulted many Botanies, but have seen no record of so marked a peculiarity in this specimen. The question is whether this is a universal fact or only a partial one, occurring only in the localities in which I have found the Pasque Flower.—*Albert Henry Barrett.*

EXPERIMENT WITH MISTLETOE BERRIES.—Having just been making an experiment with the above, I thought it probable that some of the

readers of SCIENCE-GOSSIP might be interested therewith. About a fortnight after Christmas I took some mistletoe berries, which had already done duty as decorations during the festive season, and squeezing each one separately, applied it to a branch or twig of a little hawthorn hedge. This hedge is now about three years old and is in vigorous growth. I applied, altogether, about two dozen seeds, without opening any of the bark at all, and left them to maintain their position by means of the viscous matter surrounding them. For a long time I could observe no outward difference on them, with the exception that they seemed to be swelling, so I had hope that life was present. About this period I one day observed that two or three of them had been pecked out by the birds. However, as I did not notice any more marauding behaviour of this kind, I am hopeful that a considerable percentage of the seed thus sown may grow. The next step in the way of progress—the seeds in addition to having become considerably swollen became of a bright green colour, and on several of the finest I could distinctly make out the lobed character which the cotyledons still wrapped together are beginning to assume. Last week, as I was making one of my daily inspections, I became aware of several of the little seeds having effected a junction with the branches they are attached to. Since then I have observed more of them, and I am congratulating myself that my venture will succeed. As the hedge is now fast becoming green it daily becomes a more difficult matter to find out the whereabouts of my friends. I must now wait to the end of the year, when the Hawthorn puts on its winter garb, before I shall be able to count how many have "taken." As Devonshire is *famous* for producing very little of the mystic parasite, I have had the more pleasure in my pursuit, and hope that the "Mistletoe Bough" may become a permanent denizen of my hedge.—*J. Mills Higgins, Silverton, Devon.*

GEOLOGY.

GOLD IN NEW GUINEA.—The discovery of gold in this hitherto unknown country promises, ere long, to make us better acquainted with its natural history and mineral productions. Expeditions are being fitted out, both in Australia and New Zealand, for the exploration of the interior, and the collection of general trustworthy information.

ANCIENT VEGETATION.—Professor Claypole has found the remains of Lepidodendron-like plants in the Clinton limestones of Ohio, belonging to the Upper Silurian period. The provisional name of *Glyptodendron* has been given to this, the oldest known American plant. As representing arborescent vegetation, it may be regarded as the oldest known specimen in the world.

FOSSIL INSECTS. — Mr. Scudder is preparing a work on the fossil insects of America. He has recently spent a couple of months in the Western Territories, collecting fossil insects. Six to seven thousand specimens were obtained from Florissant; all being remarkable for their beautiful preservation. There is every reason to believe that the tertiary strata of the Rocky Mountains are richer in the remains of fossil insects than any other part of the world. Mr. Scudder possesses more than twelve thousand specimens.

FOSSIL FRESH-WATER SPONGES. — Mr. J. T. Young, F.G.S., announces the discovery of spiculæ of fresh-water sponges in the so-called "flints" found in the Purbeck limestones. The spicules are like those of *Spongilla fluviatilis*, only larger. This is the first discovery of fossil fresh-water sponges in Great Britain. Mr. Young has called his specimen *Spongilla Purbeckensis.*

NOTES AND QUERIES.

IRISH WOLF-DOGS.—Will any one kindly inform me if the above dogs are extinct; if not, to whom they belong?—*L. M.*

HOW TO MAKE PLASTER CASTS OF FISH, &c.—I have read with much interest your article in SCIENCE-GOSSIP on the making of "Plaster Casts of Fishes." Being a user of plaster in my occupation as a dentist, I venture to give you a better plan of managing that material. The process of mixing water with plaster should be as follows:—Put water first into the mixing vessel, and then add the plaster to it by shaking it from a scoop as evenly as you can into all parts of the water (in large quantities through a sieve), until the dry plaster floats on the surface; stir it slowly a little; then you have the proper quantity to make it of the consistence of cream, which is also the proper consistence to use for casting; then shake or jar the vessel a little, and let it stand for a few seconds to get rid of air-bubbles. The plaster, in this state, will give plenty of time to mix more and add if necessary. You may use any quality; but I should prefer "superfine," 9s. per cwt. Trusting this will facilitate your interesting work.—*E. R. Pearce.*

A PLAGUE OF FLIES.—A small district, lying in the counties of Antrim and Derry, has this spring been afflicted with a plague of flies, entailing both inconvenience and loss to the inhabitants. The area affected was the river Bann, for about a mile and a half of its course, near Kilrea, and the pastures adjoining. The stones and plants in the river were completely encrusted with the pupa-cases of the insects, from which they issued in millions and attacked both men and cattle. The latter had to be removed from the vicinity, and many of the people had their heads and necks much swollen, owing to the venomous nature of the sting with which the insect was armed. The flies lived only for a few days, and left their dead carcases heaped up on the river banks, in some places three inches deep; they have now (1st May) almost disappeared. Some of those supposed to be wise in such matters think that these flies have had their origin in the battle-fields of Turkey; others that their advent is a portent of omin-

ous coming disasters. I enclose specimens of the flies, and also of the pupa-cases: I presume they belong to the *Tabanidæ*, or horse-flies; but why have they appeared in such force, and taken possession of the limited area referred to, where they had not attracted attention previously?—*S. A. Stewart, North-street, Belfast.*

Removing Surplus Balsam.—Allow me to call the attention of those microscopists who mount their own objects, to a most useful and effective implement for removing surplus balsam. It is the invention of Mr. Carey, of Norwood, and can be seen, by his permission, at Mr. Baker's, 244, High Holborn. I call it "The Carey Scraper." In using it, heat according to the hardness of the balsam, and run the scraper round the edge of the covering-glass, wiping off the removed balsam on a piece of paper. It comes off freely, and leaves but very little on the slide to be finished off by benzole or other spirit.—*John Bramhall.*

Natterjack Toad on the Shores of the Solway Firth (p. 67).—Sir William Jardine mentions the Natterjack as occurring "in a marsh on the coast of the Solway Firth, almost brackish, and within a hundred yards of spring-tide high-water mark. It lies between the village of Carse and Sotherness Point, where I have found them for six or seven miles along the coast. They are very abundant." The late Mr. Edward Newman also, in an article on the Natterjack published in the "Zoologist" for June, 1869, writes:—"In Scotland it has been found abundant on the coasts of the Solway Firth."—*W. R. Tate, Blandford.*

The Natterjack Toad in Cumberland.—I have for several years known of the existence of this toad on the shores of the Solway, at Silloth, a few miles from the locality noticed by your correspondent, Mr. Duckworth. I have from time to time obtained specimens by digging them out of the sand, where they hide during the day. They are found in burrows, sometimes a foot or more deep, opening usually at the top of a "scree" of sand, just beneath the overhanging turf. I have found from one to three toads in each hole. Last June I found that they frequented a pond near the railway station by hundreds. Their croaking, which was intermittent, beginning suddenly and ceasing as abruptly after two or three minutes, could be heard on a still evening more than 500 yards away. This toad, like the common one, has the chameleon-like property of being able to adapt its colour to surrounding circumstances. Those found in the sand were of a beautiful light grey, almost without any spots. Those found amid the moss and slime of the pond had large blotches of greenish yellow, not at all improving to their appearance.—*T. Lattimer.*

Wood-Pigeons' Nests.—I was much interested a few days ago, in seeing a pair of wood-pigeons that are building a nest in a tree, in a garden a few feet from the backs of houses and a public road, and not many hundred yards from a large railway station and a busy thoroughfare, with tram-cars and omnibuses to the City and West End. Is it not curious that birds, so associated in our minds with peaceful country scenes, should choose a spot so very near the great desert of bricks and mortar? If the poor birds are unmolested and hatch their young, what long distances they must travel to procure food enough for them.—*H. Budge.*

The Whitethroat a Mimic.—A curious incident occurred to my observation on Saturday afternoon, 4th May. While walking across a meadow I heard, proceeding from the hedge on the far side, a variety of guttural sounds, in which I recognised the song of the whitethroat (*Curruca cinerea*), but it was strangely interrupted by the alarm notes of the common swallow, sparrow, green and grey linnets, greater and lesser tits, and possibly a few others which I did not recognise. At first I was convinced that the several species were present. I drove the whitethroat out of the hedge, upon which he proceeded to a neighbouring one, and there resumed his imitations. Being anxious to make sure of this, I lay down near the hedge where I formerly heard him. In a short time he returned to it, and I had a favourable opportunity of seeing him. I watched him long enough to convince myself that every note proceeded from the same species. This peculiar characteristic of this bird I do not find mentioned in any books on ornithology which I have read.—*John D. Osborne, Carrickfergus, Co. Antrim.*

The Botany of the Channel Islands.—In reply to your correspondent's *first* query under above heading.—Living in the Islands is not expensive. To his second:—At a farmhouse, or private lodgings, by all means. If J. Camber will send me his address I shall no doubt be able to give him all the information he requires.—*J. Sinel, Bagot, Jersey.*

Aquarium for Microscopic Work.—I use leech vases about eight inches in diameter, which I get from the chemist for three and sixpence each. I think W. D. B. would find two or three such vases better than a larger aquarium. Among several other advantages specimens can be kept separate, and the bottom of the vase reached with the dipping tube.—*Richard B. Croft.*

R. Ficariæformis.—If some correspondent would kindly give the specific characteristics of this plant in Science-Gossip, it would facilitate search for it in the South of England.—*F. H. A.*

Pairing of Birds.—I deny altogether that we have any proof that fowls have the slightest regard for the best fighting cock, or for the superior beauty of one male over another. Such ideas are totally opposed to science and to truth.—*C. R. Bree, M.D.*

Colias Edusa and its Varieties.—The great abundance of this graceful butterfly during the past season has offered to entomologists more opportunities of studying its nature and habits than they have had for several years. The question naturally arises:—to what cause are we to impute the strange appearance in such numbers of this once-prized insect? Many are the theories that have been brought forward to account for it, but the solution of this entomological problem seems as far off as ever. Although the investigation of it has been carried on for many years, we have no explanation of this phenomenon that we can receive with any particular amount of credit. The suggestion that the insect we find here has crossed the Channel, tempted by the fineness and heat of an English summer, certainly cannot be put forward as an argument in the case of last year. But to dilate upon, or even to mention, the numerous theories that have been brought forward to account for this would occupy more time and space than I have at my disposal. Another fact may be mentioned, namely, that the number of males taken was very nearly double that of the females. The difference in the appearance of these is much greater than one at first sight would suppose. The most striking

distinction is that the male has each of its wings edged with a black border, unbroken except by very fine yellow lines that are a continuation of the veins. In the female this border is broken by greenish-yellow patches, varying in size in different specimens. Besides this there is another less striking difference, namely, that at the root of each hind wing in the male there is a light yellow spot, of which there is no trace in the female. In the SCIENCE-GOSSIP for last December one of your correspondents remarks that he noticed in a specimen of this butterfly that the hind wings were suffused with a rosy purple lustre. If he will carefully examine his specimens, he will find this apparent peculiarity is common in a greater or less degree to every specimen of the *male* insect. Those male butterflies that had very lately emerged from the chrysalis would display it most vividly, while in the female there is not the least trace of it.—*C. E. B. Hewitt, Birmingham.*

PRESERVING SKINS.—Skins of small birds may be preserved by dipping wool in carbolic acid, and stuffing the birds with the same.—*J. Y.*

THE MIGHTY DEEP.—In your issue for April, I find a very interesting paper on this subject from Mr. A. Ramsay. Will you permit me to offer to him, and to your readers, a brief remark upon it? Mr. Ramsay says—"The great bulk of the sea is cencentrated in the Southern hemisphere"—and on the authority of several authors he gives the most probable mean depth at about 2,600 fathoms. In the reports from the Challenger, as published by the Admiralty, Nos. 1, 2, 3, 6, and 7, the mean depth of 446 soundings is about 1,716 fathoms 4 feet 1 inch. I have, put down in the Geographical Magazine for March, page 66, the mean depth of the Northern hemisphere at about 1,907, and of the Southern at 1,642 fathoms; giving a mean depth all round the world of 1,774 fathoms 3 feet. The two means do not coincide, because I omitted certain coast soundings in the latter calculations. It follows, that the volume, as given by Mr. Ramsay, must be wrong; and though the surface-water area is more extensive in the South, the *bulk* of water is about the same in both hemispheres. The deepest water in the North is 4,575, in the South 2,900 fathoms; in the Arctic regions 1,860, in the Antarctic 1,800. There is water round the North Pole, and land round the South. The equilibrium of the globe seems perfect. The mean depth of the ocean, beyond coast soundings, may be put down at 1,750 fathoms; very nearly two miles. If Mr. A. Ramsay can turn his attention to the Geological Survey report of the Winter Mountains, as published at Washington, U.S., he will find some curious facts as to the depth of water in those regions in times long past.—*H. P. Malet.*

THE NATTERJACK TOAD.—Can you tell me if it is true that the Natterjack toad (*Bufo calamita*) gives forth a most intolerable odour when handled or frightened? I should be much obliged, too, if you could inform me of any place near London where this reptile may be met with.—*J. Perrycap.*

OUR BRITISH SNAKES.—In answer to a question put in the February number of the SCIENCE-GOSSIP as to whether our British snakes eat birds or mice, I can state positively that the viper eats both. In 1876 I killed a viper, which I found to contain six young willow wrens, feathered, and within a few days of flying. Last year I killed a young one, which contained a large long-tailed field mouse. Can any of your readers give me any information as to how or why the blind-worm carries its young in a case, in its back, and how long this continues? and do either the viper or ringed snake do the same?

REMARKABLE NESTS.—This year we have noticed three curious instances of a departure from the usual habits of birds in building their nests, which seem worth recording. The song-thrush lines her nest with cow-dung and clay; and it is usually considered by ornithologists that, as she builds very early in the spring and frequently in exposed situations, the mud lining protects the eggs and the young brood from the fierce March winds. Early in March we found a thrush's nest in our garden, containing four eggs; but the nest had not a vestige of the usual mud lining. Unfortunately we found the nest destroyed one morning before the bird had time to hatch, so it was impossible to note whether the inclement weather had any effect on the eggs. We have at this moment a blackbird sitting upon six eggs, four of which are her own and the other two those of the song-thrush. When first the nest was found it contained two of each kind, a thrush having laid in the blackbird's nest. Although sparrows will sometimes appropriate swallow's nests to build in, and though several birds will build a new nest on an old foundation, it is, I think, very unusual for one species—the cuckoo, of course, excepted—to make use of a nest built by another species. The third curiosity in nest-building is the nest of a chaffinch, placed in the fork of an elder-bush near our house. Usually the chaffinch assimilates the colour of her nest to the situation in which she places it; if she builds in a hedge she generally covers it with green moss; but if she builds, as she often does, on the bare branch of an old apple-tree, she uses the grey lichens, which are usually near at hand, and covers her nest with them so skilfully that though quite open and exposed it becomes hidden by its resemblance to a knob or excrescence of the tree itself. In this case, however, though the bird has recognised the necessity of covering her nest with *something*, she has rendered it most conspicuous by sticking little bits of white decayed wood all over it. The wood is so white that the nest looks almost like a snowball in the branches. Possibly this bird may be colour-blind, or she may be just a little bit "wanting" in her instinctive faculties, as human beings are occasionally in their reasoning powers. Why not?—*Robert Holland, Norton Hill, Runcorn.*

HOW LONG CAN A FISH LIVE OUT OF WATER?—A friend of mine some days since removed a gold-fish from a glass globe, on account of its having mildew (probably a parasitic growth of *Epistylis*). It was placed in a basin of water at night on the kitchen dresser. In the morning, at six o'clock, my friend discovered the fish was missing from the basin, and could be nowhere found. At past twelve o'clock at noon the fish was discovered behind some plates under the dresser; as it moved when handled it was placed in water, when it gradually revived, and is now as lively as ever. This unfortunate fish was certainly above six hours, possibly much more, out of its proper element, and in my experience I have never known one to survive one quarter that time.—*Henry Taylor, Peckham.*

SPARROW-HAWKS AND WINDOWS.—On hearing a dash against a plate-glass window in an adjoining room, I found a sparrow-hawk lying on its back, stunned, with its wings extended; taking it carefully up, after holding it in my hands for a minute I placed it on its legs close by a plate of water; it gradually recovered, tried its legs, and in about ten

minutes flew away. Kindness to it, was I fear, cruelty to other birds.—*A Subscriber.*

EARLY APPEARANCE OF THE SWIFT.—I was agreeably surprised this morning (May 1st) by the premature spectacle of a swift (*Cypselus apus*) hawking over this town. This is the more singular, from the fact that the other summer migrants have been unusually late in their arrival in this neighbourhood. The swallows appeared first on April 19th. I heard the cuckoo for the first time on April 26th, and the nightingale on the 28th.—*W. R. Tate, Blandford.*

WHAT IS THE BEST MIXTURE FOR "SUGARING"?—I have generally used coarse sugar, beer, and rum. Can any of your readers suggest anything more attractive for moths? Is it ever successful except in autumn?—*Walter W. Walter, The Gables, Stoke-under-Ham.*

HOW TO DESTROY ANTS.—Can any of your readers inform me of the most successful mode of destroying ants, so great a nuisance to many householders?—*George Pearce.*

"DITTANY," &c.—Will some botanical expert assist me to the exact name of the species of "*Dittany*" or "*Dittander*," and "*Dictamium*"? The words frequently occur in the Elizabethan writers; but as their learned modern editors hold all natural history in contempt, they merely copy from the old dictionaries one after the other. The synonyms are all confused; as Floris says dittany is garden rue, while Cotgrave gives garden ginger, peppermint, &c.; then Halliwell says, the first is cayenne pepper, and another authority that there is no such thing; and Bentham (Handbook) adds that *Dittany* is "the *Fraxinella* of Gardens," and not a British species, while *Dictamium* is always got over as a bastard sort of *Dittany.* Also, what species is the *Mandrake,* so common of mention by our early poets? Bentham has merely, "Mandragora, an exotic"; and your notice of the "Rolls MS." says "White Bryony," a name not found in Bentham or Sowerby's "Wild-Flowers." The glossaries, of course, afford no help as to species. The English Dialect Society have long promised us a book of "Plant names," under the most competent editorship, but the long delay makes us despair of it in any reasonable time.—*Henry F. Bailey.*

AQUARIUM MATTERS.—Your correspondent Edward Step seems to have been lucky in hitting upon a mode of keeping aquaria without difficulty, and I am glad his system gives him satisfaction; but I think, if his washing-tub arrangement is correct, most of the readers of his letter, with any knowledge of the subject, will think that he is deluding himself with the idea that he is keeping aquaria, whereas he is only keeping a small ditch; for, that water can be kept clear and inodorous for any length of time in a tub in which there are all sorts of aquatic plants, animals, insects, &c., I much question; and that such fish as dace, roach, perch, trout, &c. will live many days in such water, my experience makes me deny. The tub, mud, and water arrangement may do very well for Edward Step if he only wants to keep objects for the microscope, but to fill a vessel with mud and water, and to place in it animals, fish, snails, insects, and plants, irrespective of quantity or selection, and let them fight and devour each other until they have established what he calls the balance of power, is about the queerest way of keeping aquaria I know of. It is acting upon such injudicious advice that has made aquaria-keeping so rare in private houses. People have been told that they have only to get a vase or glass tank, fill it with water, put some mud or sand at the bottom, place water, plants, snails, fish, caddis-worms, reptiles, beetles, or anything they find in a river, ditch, or pond in it, and they will at once have a thing of beauty and a joy for ever: they do so, and, after weeks of patient waiting, they find they are keeping a mass of slimy decaying plants, dead fish, &c., in water which the wife or housekeeper declares is not only very odorous but very dangerous. If fresh-water aquaria are to be kept to be of any use or pleasure, they must be so upon a judicious selection of situation, plants, and live stock, which live stock are most accustomed to still waters, and if your correspondent had had a little more field and river experience before setting up his tub, he would, perhaps, have discovered that there are plants of the river, pond, ditch, and stream; and fish, mollusks, &c., of the same, each having its own habitat in which it will flourish.—*Ben Plant, The Crescent, Leicester.*

V. ANTIOPA.—I always thought that the difference between a foreign and a British specimen of the above-named insect was, that the former had a *cream*-coloured margin, and the latter had a *white* one; but during the last few months I have been often told that there is no difference. I should be much obliged if some of your entomological readers would give me an answer.—*W. R. Morse, Norwich.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

SCIENCE-GOSSIP BOTANICAL EXCHANGE CLUB.—We shall be glad to receive the names of all intending members. The subscription (5s.) is intended to cover expenses of carriage of specimens to and from those botanists who are engaged in naming them, postage, printing, &c. The scientific labour is in every instance gratuitously given. It has been thought, however, that even this sum might be too great for some members, and it is therefore decided that in the cases of *bonâ fide* working men, who may desire to become members, the fee shall be reduced to 2s. 6d. We feel certain that all members will at least desire that the Club shall be self-supporting.

W. H. L. (Bristol).—Your letter contained nothing but some granular red powder.

C. GOULD.—The "Trumpet," or "cup-moss" as it is also called, is not a moss but a lichen, called *Cœnomyce pixidata.*

X.—The spider's threads used for astronomical purposes are those of the Common Garden Spider.

J. W.—The specimen is that of the Common Primrose. Your other flower is that of the Wood Sorrel (*Oxalis acetosella*); and your fern the Maiden-hair Spleenwort (*Asplenium trichomanes*). Get Mrs. Lankester's "Familiar Wild-Flowers," with coloured plates, published by Hardwicke & Bogue, 192, Piccadilly.

W. A. PEARCE (London).—The enclosed water-plant is a pond-weed (*Potamogeton crispus*).

T. H. BUFFHAM.—The better plan would be to sow the seeds. You would then with ease determine the species; it will probably prove to be a *Galium.*

A. B. (Kelso, N.B.).—Thanks for your kind suggestions; in a few days we hope to send out the Rules of our S.-G. Bot. Ex. Club; we beg to acknowledge *Callitriche hamulata.*

R. F. Z. (Salisbury).—It is difficult to state why the leaf is discoloured, however we find the cells in the parenchyma are devoid of chlorophyll, excepting on one side, then only in very small quantity; you will be able to prepare a good microscopic object from the white part.

E. H. (Stepney).—Procure "The Flora of Faversham, Kent"; it is a most interesting and readable volume.

D. McD. (Edinburgh).—We have a very old proverb, well known in many parts of England, "When the gorse is out of bloom, kissing is out of favour." The latter part is varied, as "kissing is not in fashion."

S. B. (Oxford).—A few slugs and small worms for the common snake and blindworm will serve admirably as food. The same kind of food, with such dead flies as may be picked up from the windows during the summer, will supply the lizards. Keep both dry moss and sand at the bottom of your box.

"ARINAS."—We cannot undertake to say what the object you mention is without seeing it. It may be a fungus, but could only decide upon seeing it.

F. L. ST. A.—The Fritillary is a variety of *F. meleagris*. The fungus is *Polyporus betulinus*.

J. G. J.—Your beetles to hand. The larger one is *Dytiscus marginalis* (male); and the smaller is *Acilius sulcatus*.

B. M. O.—Your mosses are as follows:—A. *Hypnum sylvaticum*; B. *Tortula muralis*; C. & D. *Hypnum palustre*; E. *Weissia controversa*; F. *Hypnum serpens*; G. *Fissidens viridulus*; H. *Bryum atropurpureum*; I. *Polytrichum commune*.

W. E. GREEN.—Your mosses are:—1. *Tortula nitida*; 2. *Bryum pseudotriquetrum*; 3. *Hypnum albicans*; 4. *Hypnum prælongum*; 5. *Hypnum Kneiffii*; 6 & 7. *Hypnum cupressiforme*; 8. *Hypnum Swartzii, B.*

EXCHANGES.

WANTED sections of common woods, bone teeth, &c., foraminifera, feet and parts of insects, diatomaceous earths, &c., in exchange for well-mounted slides.—C. W. Lawton, 200, Essex-road, Islington, London.

ONE-HOLED eggs of Dipper, Wheatear, Creeper, Long-tailed Tit, Pied, Yellow, and Grey Wagtails, Red-winged Starling, Rook, Jackdaw, Magpie, Golden-winged Woodpecker, Kingfisher, Stock Dove, Turtle Dove, &c., &c., to exchange for Nightingales, Reed Wren, Owls, Wrynecks, or other eggs.—J. F. Pratt, Westgate, Ripon.

COLORADO Potato Beetles. Unset specimens to exchange for examples illustrating Economic Entomology.—R. S. Hulbert, 40, Catherine-street, Strand, W.C.

MATERIAL for slide of crystals for Polariscope in exchange for good unmounted Entomological object (not wing).—Wm. Sargant, junr., Caverswall, Stoke-on-Trent.

BIRDS' EGGS, side-blown. Well-marked specimens, labelled, 300 varieties. Exchange for others new to collection. Send at once for my list. All letters answered.—H. Sissons, Westbourne-road, Sheffield.

J. W. BULMER, near the Church, Northallerton, Yorks, will exchange small screw printing-press, type, &c., also bird eggs, for gold fish and other small fish for aquarium or fish-globe.

FOR *Gomphonema geminatum*, as collected, send stamped envelope with micro-object of interest, or a well-mounted slide in exchange.—James Simpson, 48, Arthur-street, Dumbiedykes-road, Edinburgh.

Poa bulbosa and *Corynephorus canescens* for 1479, 1483, 1484–1487 and other rare grasses, London Catalogue, 7th Edition.—J. Keogh, 25, Camperdown-place, Great Yarmouth.

FOR well-mounted palate of land-snail or slug send good slide, not diatoms or polariscope object.—Henry Insley, 1, Back Chester-place, Gerrard-street, Birmingham.

LARVÆ of *Quercus, Salicis, Dispar, Monacha, Castrensis, Trepida, Cæruleocephala*, &c., for Lepidoptera in any stage; or good Bird Eggs.—Roland Green.

WANTED diatoms mounted or unmounted, or any thing of interest, for crystals mounted, diatoms mounted *in situ*, zoophytes' palates mounted or unmounted, starches to show the adulterations of food, &c.—Arthur Smith, 198, Essex-road, Islington.

FOR insects mounted whole send mounted slides, clean, of diatoms, eyes of insects, diatom mounted *in situ*, &c. Only a limited number to exchange. Apply early.—Albert Smith, 198, Essex-road, London.

I HAVE SCIENCE-GOSSIP 1877, bound, photo of Darwin, two dippers (skins), and green woodpecker and Ray's wagtail (wired). Wanted British Coleoptera, Lepidoptera, side-blown birds' eggs, or mounted diatoms.—W. Barrett Roué, 165, White Ladies-road, Bristol.

WANTED in exchange for SCIENCE-GOSSIPS, Grattan's "British Marine Algæ," either bound or unbound.—John D. Duthie, Stonehaven, N.B.

WANTED side-blown eggs in large quantities, every variety almost. Exchange as may be arranged. Correspondence answered from all parts, especially foreign.—John Wm. Sissons, Sharron, Sheffield.

RARE and local Suffolk plants during the season for exchange. Now ready Nos. 1039, 1337. Shall be glad to hear from former correspondents.—W. Jordan, Cockfield, Sudbury, Suffolk.

SCIENCE-GOSSIP for 1876 and 1877 offered in exchange for fossils or shells.—A. Harker, Spring Bank, Hull.

RARE Zoophytes and cleaned Foraminifera wanted. Will give in exchange good wood sections, soundings, and other material.—H. L., 6, Upper Phillimore-gardens, Kensington, W.

FOR slide of parasite of horse (*Trichodectes equi*) send a well-mounted parasite to W. A. Hyslop, 22, Palmerston-place, Edinburgh.

LONDON CATALOGUE, Nos. (7th Edition) 20, 27, 35 with bulbils, 93, 96, 203, 206, 299, 301, 398, 352, 516, 532, 550, 608, 645, 671, 726, 932, 995, 1015, 1169, 1387, 1405, 1442, 1452, 1501, 1586, 1623, 1652, offered for 10, 11, 46, 47, 48, 56, 66, 68, 92, 104, 116, 131, 251, 264, 270, 358, 360, 365, 369, 374, 396, 474, 495, 502, 566, 574, 590, 600, 620.—Wm. West, 15, Horton-lane, Bradford.

Asarum Europæum or *Asarabacca*. Specimens of this rare British plant in exchange for others of equal rarity, ferns preferred.—James W. Lloyd, Kington, Herefordshire.

SEVENTH Edition London Catalogue, *Juncus pygmeus*, *Carex capillaris*, and others.—L. Tellow, 19, Radclyffe-street, Oldham.

FOR a slide of C. and Anchorate spicules send some object of interest, Foraminifera preferred.—A. Alletsee, 11, Foley-street, London, W.

EITHER living or mounted specimens of *Zonites cellarius*, *Zonites excavatus*, for either *pupæ, larvæ*, or *imagos* of moths or butterflies, British or Foreign, or other offers.—T., 26, Parker-street, Warrington.

NOEL Humphreys' "British Moths," *Macro and Micro*, splendidly coloured. Wanted eye-piece or object glass for microscope.—W. Harper, Norfolk-park, Maidenhead.

WANTED parts of Foreign Beetles and Butterflies, Foraminifera, Zoophytes. Stained anatomical preparations and all kinds of unmounted material in exchange for good specimens.—Alpha, 16, Brunswick-street, Poplar, London, E.

EGGS of sparrowhawk, bullfinch, common bunting, red wagtail, chiffchaff, &c., in exchange for others.—G. B. Wood, Lindow Grove, Alderley Edge, near Manchester.

WANTED *Bulimus Reevei* and *Bulimus Portei* and other Philippine land shells. Many rare species offered in exchange, British and Foreign.—Address, F. M. Hele, Fairlight, Elm-grove-road, Cotham, Bristol.

A NATURALIST, who is going on a dredging cruise round the South and West coast of England, would be glad to hear from a gentleman having similar tastes who would be willing to join him and pay a small part of the expense. For further particulars address C. P. Ogilvie, F.L.S., Sizewell House, Leiston, Suffolk.

Salix alba, var. *cærulea*, offered for other good plants; rare species of *Rubus, Rosa, Pyrus, Carduus, Hieracium, Salix, Scirpus*, and *Carex* especially desired.—E. W. Andrews, University School, Hastings.

WANTED, SCIENCE-GOSSIP for 1874–5–6, except Oct., Nov., and Dec. 1876. Offered, double the number of weekly parts of "Nature" and a quantity of consecutive numbers of the "Garden," or offers.

FOR disposal, at a very cheap rate, a beautiful series of polished sections of Carboniferous corals from Clifton, Bristol. —Apply to S. G. Perceval, Henbury, Bristol.

L. C., Nos. 135, 209, 235, 253, 555, 556, 577, 581, 605, 653, 683, and many others, for other rare plants. List exchanged.—J. Tempère, 10, Heald-place, Rusholme, Manchester.

BOOKS, &c., RECEIVED.

"Flowers: their Origin, Shapes, Perfumes, and Colours." By J. E. Taylor, Ph. D., F.L.S., &c. London: Hardwicke & Bogue. Price 7s. 6d.

"Tropical Nature." By A. R. Wallace. London: Macmillan & Co. Price 12s.

"Nutrition in Health and Disease." By Dr. J. H. Bennet. Third Edition. London: J. & A. Churchill.

"The Planisphere, and How to Use It." London: J. E. Catty.

"Transactions Watford Natural History Society."

"Industrial Art." May.

"Land and Water."

"American Naturalist." April.

"Potter's American Monthly." April.

"Familiar Science and Fancier's Journal."

"Science pour Tous."

"Chambers' Journal." May.

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 9TH ULT., FROM:— F. K.—T. McG.—W. B. R.—J. S.—N. B. C.—G. T. B.—R. G.—R. L. H.—L. J.—J. P. G.—W. H.—G. B. W.—E. H.—W. W.—A. A.—D. J. P.—J. D. O.—A. H.—J. W. W. —W. H. L.—J. H. A. J.—L. T.—J. S.—J. W. R.—H. L.—W. R. T.—W. B.—T. P.—G. C. D.—H. L. S.—J. B.—W. A. P.—H. R. P.—H. I.—W. B. B.—W. B. G.—J. W. S. —W. J.—T. H. B.—H. T. S.—J. V.—Z. L. E.—F. R. M.—A. S.—A. C.—F. M. H.—S. A. S.—L. S. E.—H. C. C.—J. D.—R. H.—Dr. de C.—E. D. M.—H. P. M.—W. A. H.—J. W. L.—H. E. W.—J. A. K.—H. L.—J. M. H.—T. L.—H. B.—C. G.—J. D. D.—J. K.—J. H.—A. H. B.—H. T.—W. H. B.—J. K.—Dr. B.—J. F. R.—R. B. C.—C. W. L. —F. H. A.—J. F. P.—S. B. A.—H. S.—H. J. J. L.—F. A. St. A.—A. P. W.—E. R. P.—J. G. J.—E. E. E.—W. S. jun. —W. S. F.—J. W. B.—W. S.—H. F. B.—J. B. G.—R. S. H. —Dr. L. G. M.—R. M.—&c. &c. &c.

THE PRONUNCIATION OF SCIENTIFIC NAMES.

THE question as to "the pronunciation of scientific names" which has been raised and discussed in some of your recent numbers, is one in which I take a considerable interest. The subject is only one branch of the much larger question now being freely discussed amongst scholars—the proper pronunciation of Greek and Latin words generally—whilst, under another aspect, it is only one branch of that well-named "Opprobrium Botanicorum"—the subject of botanical nomenclature, a subject upon which I have a few crotchets, which I should be glad, on some future occasion, to have the opportunity of airing in your journal.

Your correspondent Mr. Newlyn makes two assumptions, from both of which I beg leave to differ. First, he assumes that we have no means, except *accentuation* (by which, from his reference to "the poets," he plainly means *quantity*), to guide us to a knowledge of the mode of pronunciation which the Greeks and Romans themselves adopted: and, secondly, he assumes that "university men" at the present day acquiesce in the barbarous practice of English scholars during the two or three last centuries only, of pronouncing Greek and Latin words as if they were English; whereas those who know the Universities know well that both there, and in our large public schools, a sturdy effort is being made to bring back the pronunciation of Greek and Latin words to what we have good reasons for knowing, or believing, was the actual pronunciation in a Greek or Roman mouth of classical times. And to those who give themselves to the study of the subject, indications of the old method of pronunciation are not wanting; although the difficulty of arriving at a satisfactory solution is greatly increased by the fact that then, as now, the pronunciation in different provinces at the same time, and in the same province at different times, varied considerably.

However, means for recovering the old pronunciation are not wanting to those who are on the lookout for them. One principal source of information is the mode in which the ancients represent natural sounds, which certainly have never changed, and for the vowel sounds this alone is almost sufficient. Thus, Aristophanes, in the "Acharnians," introduces a countryman with a pig under his arm. And the part assigned to the pig is written (I write in Roman, not in Greek letters) *koï—koï—koï*: now let any one repeat ko-ee, ko-ee, ko-ee, several times, rapidly, and he will find that it gives perfectly the sound of a pig's squeak, and leaves no room for doubt that by Aristophanes and his contemporaries the letter *i* was pronounced *ee*. Again, the Latin word for a breast is *mamma*. And there can be no question that a Roman infant called for the breast in exactly the same sounds as an Anglo-Saxon infant calls for the mother who presents it to him, pronouncing the *a* as *ah*. So—*cuculus* (the cuckoo), *ulula* (the owl), *mugire* (to low like a *moo*-cow), supply plenty of proof that *u* was sounded like double *o*; not as we sound it, as if it was written *yoo* (which is really a diphthong—*ee-oo*).

Then as to consonants. That *c* was always pronounced hard before *e* and *i*, as well as before *a*, *o*, and *u*, is manifest from many indications. Thus, it always represents the Greek kappa, in words derived from the Greek; *e.g.* Kentauros is represented by Centaurus. Kimmerioi becomes Cimmerii, and (by transposition) in English Crim-Tartary and the Crimea, which shows that the *c* was pronounced hard when the transposition was made. A very clear indication of the hardness of the *c* is afforded by those very numerous places in Ireland which begin or end with *kil*, such as Kilkenny, Clonkill, &c., all of which were formerly the seat of a monastery, known as *Cella* (alluding to the solitary chambers of the monks), and proving most convincingly that the *c* in *cella*, in the early centuries of the

Christian era, was pronounced as *k*. Again, a joke preserved by Quintilian serves to show that *qu* was also pronounced like *k*, not, as in English and modern Italian, as *coo*. Quintilian mentions that a man who had formerly been a cook, but had risen in life till he had become a great swell, having on some occasion said something insulting to a man who knew his origin, the latter replied, "Et tu quoque," where the whole force of the joke lies in the pronunciation of *quoque* and *coque* being identical.

But I must not continue these illustrations at a length which would suit a philological rather than a natural history journal. Suffice it to say that there is plenty of proof of the sound of all the vowels, and of most, if not all, of the consonants. And I live in hopes that, if not the present, the next, or perhaps the *paulo-post-futurum* generation will not only, by careful research, have recovered the genuine old pronunciation, but will make use of it in reading or speaking Greek and Latin.

But when we have arrived at the conclusion of its being both desirable and possible to pronounce Greek and Latin literature as Greeks and Romans would have pronounced it, it still remains to consider how far it is either desirable or possible to pronounce botanical, or other scientific terms, according to the rules of genuine Greek or Latin pronunciation. As regards genuine Greek or Latin words, such as *Geranium*, *Hieracium*, *Cineraria*, I know no reason, except persistence in a vicious custom, why they should not be pronounced in proper Greek or Latin fashion, with the *c* or the *g* hard. But what are you to do with the atrocious barbarisms, the disgrace of all sciences alike, with which the bad taste of modern times has encumbered our nomenclature? Take such words as *Brownii*, *Smithii*, *Lecocquii*, *Hookeria*, *Scheuchzeria*, and (worst and most frightful of all) *Warsiewiczii*. No rules for the pronunciation of Greek or Latin words will ever enable any one to make any of these sound in the least degree like a Latin word. And for this very good reason; namely, that they are not Latin words, but only English, French, or German, slightly disguised by having a Latin tail tacked on to them; and reminding one very much of the statues of old George III., with his stiff pig-tail protruding, clad in a Roman toga, or a Greek chlamys. With such words, as I fear it is quite hopeless to get rid of them, the only thing to be done is to mark their bastard and mongrel origin, by pronouncing them, the head according to its nationality, and the tail only in Latin fashion.

How the Romans themselves would have dealt with these uncouth sounds we are not left to conjecture merely. A characteristic instance presents itself in the place at which I am now writing, Church Stratton, in Shropshire. Close by is a hill, on which the British chieftain Caradoc maintained his last fight against the Roman power. The hill still bears his name, and is called *Caer Caradoc*, the Seat of Caradoc. This name (with the accent on the penultimate syllable, according to the general rule in Celtic words) is obviously the original of the, not uncommon, surname of *Cradock*, or *Craddock*. Now, suppose the discoverer of a new plant, wishing to honour a botanist of the name of Cradock, in all probability he would designate his discovery by the hideous title of "*herba Cradockii.*" But what did the Romans themselves do with such an unaccommodating word? Now it so happens that one of the most classical of Roman writers, viz. Tacitus, had a good deal to say about Carádoc, but he has adapted his name to Latin ears, and speaks of him always as *Caractacus*. Plentiful instances of this adaptation of names occur even in Scripture, to which I need not more particularly refer. The New Testament version of Old Testament names, such as *Jesus* for *Joshua*, *Eliseus* for *Elisha*, &c., shows the principle upon which the writers of that age proceeded. In the time of the Renaissance they adopted a, perhaps better, plan, wherever it could be resorted to; that, namely, of *translating* those names which (as is the case with most) have a distinct meaning. Thus, *Hausschein* becomes *Œcolampadius*; *Schwarzerd* is rendered *Melancthon*; *Hahn* is known as *Gallus*; and so on. Now, if these writers had been botanists, instead of theologians and musicians, and it had been desired to commemorate them by giving their names to plants, we should have been tortured by the barbaric words—*Hausscheinii*, *Schwarzerdia*, *Hahnii*, &c. &c., instead of the equally commemorative, but far more euphonious designations of *Œcolampadii*, *Melancthonia*, *Galli*, &c. And why cannot we now adopt the same plan, and instead of *Brown* take *Fuscus*, for *Smith* write *Faber*, for *Hooker*, *Hamator*, &c. &c. &c. Linnæus himself is, no doubt, responsible for many of the uncouth names with which botanical nomenclature abounds. But even he on occasion could make a concession to euphony, as witness his turning such a harsh-sounding word as the German for a sore-throat, *Breune* (pronounced Broina), into the pleasant-sounding *Prunella*.

But the great difficulty in the way of a correct pronunciation of classical and pseudo-classical words used in botany is undoubtedly the question of quantity; and it is perfectly astonishing, in turning over botanical works, written, too, by persons who are supposed to have some scholarship, to see the flagrant blunders and erroneous marking of quantities which they exhibit. Many of these are simply the result of carelessness, and arise from the author not giving himself the trouble to think for a moment of the real origin of a word. Thus the very common pronunciation of Œnothĕra, with the *e* short, arises only from the carelessness of not remembering that the plant originally so called (by Dioscorides I think, but I have not got him at hand to refer to) was used by the Greeks as we use olives, to give an appetite for wine, and thence derived its name from Oinos and

Therao. The latter word spelt with an *eta*, and therefore as long as daylight on the 21st of June.

But the real difficulty, especially in Greek words, or words derived from the Greek, arises from the conflict between *accent* and *quantity*, the true principles of reconciling which are as yet but very imperfectly understood. Thus, I can even find an excuse for some persons who will pronounce the *i* in *Veronica* short, although they know its origin (from *Vera eikon*), and that the *i* represents the diphthong *ei*. But then the Italians throw back the accent and call the Saint *Santa Verónica* (with the accent on the *o*), which has the effect, to careless ears, of making the *i* seem short. But no such excuse can be offered for making the *i* in *Hypericum* (from *huper eikon*) short, or the *e* long. In words like Conium, Geranium, Hieracium, &c., indeed accent has beaten quantity out of the field; and despite the fact that the *i* in these words represents the necessarily long diphthong *ei*, we always pronounce according to accent, which is thrown back on the ante-penultimate, just as we do in speaking of Arius, or Alexandria, although in the original Greek the words are Areios, Alexandreia. But what are we to do in such a case as *Sisymbrium Sophia?* Are we to pronounce the *i*, according to accent, long, as we do in the common female Christian name, or short, according to its quantity, as we do in pronouncing Philosophia. And the worst of it is, that even in this matter of accent we are so abominably capricious. Thus the tendency in English to throw back the accent will perhaps account for our making the *o* in anemone short. But why, in the world, in defiance of this tendency, and against every rule of quantity, do we make the *a* in Clematis, and the *o* in Gladiolus, long?

After all, however, as the great majority of communications upon botanical subjects are made in writing, it matters only to a few professors, who are called on to deliver lectures orally, and their pupils, how the words are pronounced. But as they are regarded as authorities, and their practice gradually rules that of the ordinary run of students and amateurs, it is a great pity that the leading men amongst them do not establish some agreement between themselves as to the principles which should for the future prevail in the pronunciation (and, I would add, the formation) of classical and pseudo-classical words, adopted, or to be adopted, into the botanical vocabulary.—CHAS. BROWNE.

AQUILEGIA.—This word is generally believed to be derived from the Latin root *Aquila*, an *eagle*. Is this correct? Is it not rather obtained from an old word, *Aquilegium*, signifying a gathering of water. The spurs of the petals are often partly filled with water, or some honied secretion; in early times they may have been thought to be to collect rain or dew, hence its subsequent generic name; but the resemblance in any way to an eagle must be very far-fetched; besides, look at the long terminology if it is really derived from Aquila.

THE TEETH OF THE BLOW-FLY.

BY THE REV. L. G. MILLS, LL.D., F.R.M.S., &c.

DURING the summer of last year I made a careful examination of the proboscis of the Blow-fly, with a view to determine the particulars of its structure, and to discover the causes of the difficulties* which have been felt by some, in their endeavours to get a clear and distinct view of the teeth, and their failure to trace them in the position which they are now well known to occupy.

I was the more anxious to make this examination, because, long before Mr. Suffock or Dr. Lowne had given any account of these teeth, I had been very successful in mounting many specimens of the entire proboscis, upon Mr. Topping's plan, and, quite satisfied with my performance, and the beautiful view of the general structure, I did not observe anything to lead me to suspect even the existence of teeth in these preparations. However, when I read Mr. Suffock's paper, as given in vol. i. of the "Monthly Microscopical Journal," and having studied the illustrations there given, I re-examined my preparations, and, on a few of them, I was able to verify the account, and clearly to see the teeth as figured in the "Microscopical Journal." The causes of my failure to discover the teeth until my attention was directed to the fact of their existence, may have some relation to the difficulties that are still felt by some to see them, and their vain endeavours to trace them, even with the knowledge of their position, and on slides of especially prepared dissections.

I desire therefore to give the reasons for these difficulties as they appear to me; to give a clear figure and explanation of the structure of the teeth; and to give a method of preparation whereby even the unskilled operators may succeed in mounting simple dissections that will give very distinct and unmistakable views of them in their position, and show their particular structure.

In whatever way the proboscis may be mounted, it is important to observe that the pseudo-tracheæ be upwards,—that is, next to the thin covering glass. A mistake on this point would, of itself, be sufficient to prevent any clear view of at least two of the three rows of teeth. The object is usually examined with a quarter-inch object-glass, and by the aid of transmitted light.

Now, it is plain from the nature of the proboscis, that the light from the mirror must pass through the two membranes of lips before it can fall upon the teeth. One of these membranes, the lower, appears to be thickly dotted with dark spots, due to a number of hairs that are closely set on that membrane, and two of the rows of teeth, at their free ends, are very transparent, and pale in colour, and they

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* SCIENCE-GOSSIP, Vol. XII. page 69.

terminate a little above and near to the strongly-marked ends of the pseudo-tracheæ.

These tracheæ and the dotted membrane obscure the view of the teeth, and, in many cases, it is only by a particular and careful management of the mirror that it becomes at all possible to discern the thin lines of light or shade that mark the outlines of their bifurcate extremities.

Further, in mounting the object upon Topping's plan, pressure is used on the head of the fly with the design of throwing the proboscis into position of expansion before being fixed on the slide, and in doing so a dark reddish fluid generally passes into the proboscis between the membranes and under the teeth, thus giving an additional hinderance to the view required. I had found that prolonged steeping in turpentine will bleach the teeth rather than remove the stain, and only increase the difficulty of examination. Sometimes, however, a case will occur in which this latter difficulty, even without especial caution, will not arise; then the teeth and pseudo-tracheæ will be fairly seen, as in the following figure of a small portion of one of the lips of the proboscis.

As may be seen in the foregoing figure, there are three rows of teeth. These lie one above another, and their free ends crop out between the lines of the pseudo-tracheæ. The teeth of the first or uppermost row are simple and strap-shaped chitinous bands, and for a considerable portion of the length of each tooth the band is turned in on each margin, and then for the remainder is flattened out and widened before it is terminated in the thin and knife-edged bifurcate extremity.

The teeth of the second row differ somewhat in form from those of the first. Each tooth is not a simple and single strap, but, for about two-thirds of its length, is a divided one, and springs from two different points of attachment, as in the following figure.

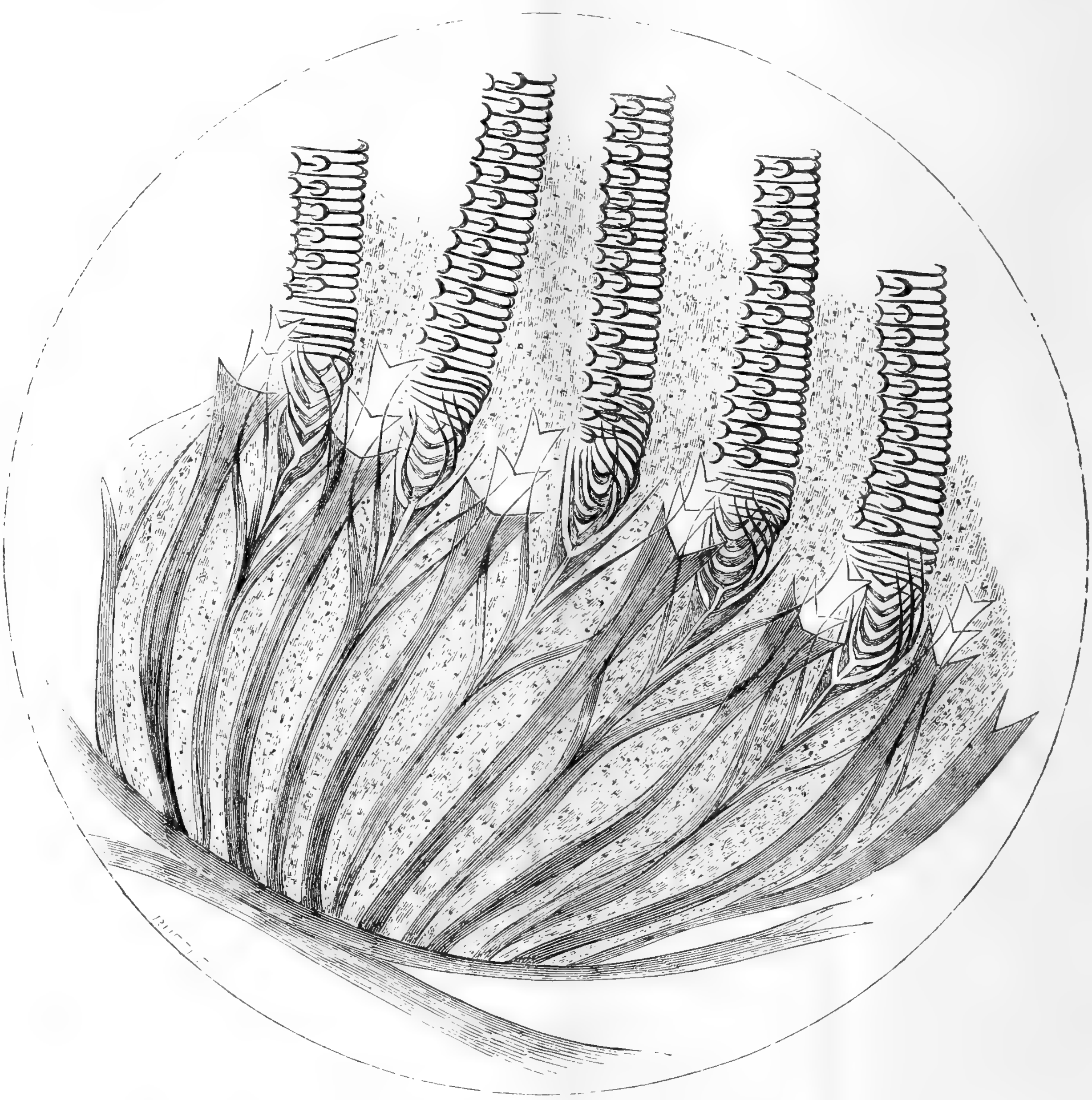

Fig. 100. Teeth of the Blow-fly (mag.).

The two bands of chitine join, and are then flattened out and terminated as in the tooth of the first row, but much fainter in colour, and by no means so easily distinguished and observed.

The teeth of the third row are similar in structure to those of the second, but only of half their length, and they spring from quite different positions in the

lips,—namely, from the points in which the bands separate which go to form the teeth of the second row. This will be clear by reference to fig. 101, where the points *pp'* are those from which one of the teeth of the third row has its divided origin, *u*, where the bands unite and become flattened out; after which the tooth is soon terminated as in the teeth of the other rows, but still thinner, sharper, paler in colour, and more delicate in outline, so as frequently, with every care and the best appliances, to be difficult to observe.

The explanations I have given are I think sufficient, and it will appear that the arrangement of the three rows of teeth is such as to permit their superposition with the flattest possible surface, and consistent with the greatest steadiness of position.

By contrasting the structure of the broken rings of the pseudo-tracheæ at about the centre of one of the lines with those at the termination of the line, and near to the teeth, and comparing these latter with the teeth themselves, I think it will appear that, after all, the teeth are but developments of the pseudo-tracheæ, and that the transition from the one form of structure to the other is by no means abrupt, but that, on the contrary, the rings of the pseudo-tracheæ become gradually changed as they approach toward the teeth; that each tooth of the third row is but a simple development of the nearest rings of the adjacent pseudo-tracheæ; the teeth of the second row but a further development of those of the third; and finally, the strongly-marked simple strap-shaped teeth of the first row are but further and final developments of those of the second.

It now only remains that I should suggest a plan by which any ordinary operator with but little skill may prepare slides that will afford distinct views of the teeth as well as of the pseudo-tracheæ.

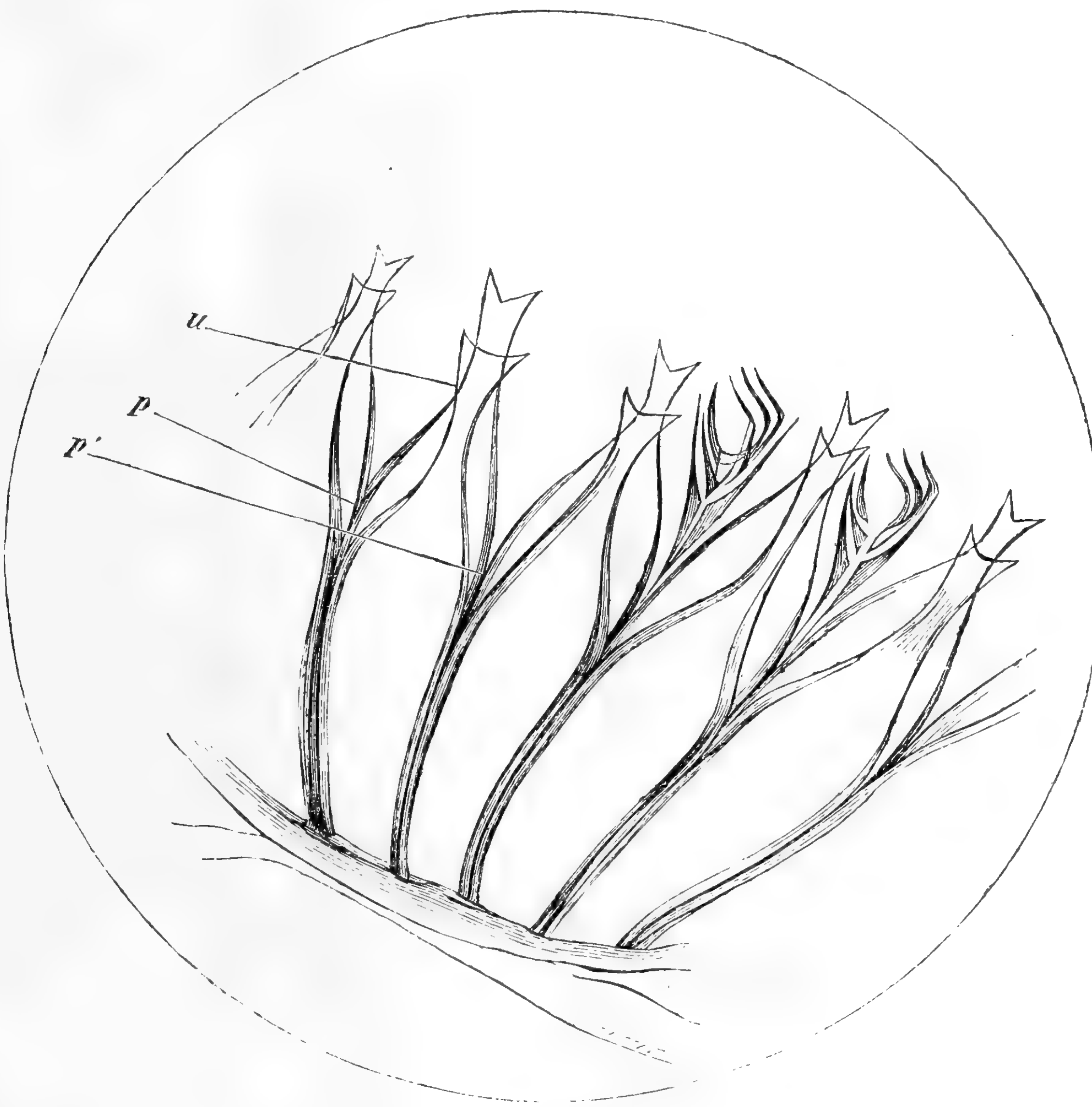

Fig. 101. Teeth of the Blow-fly (mag.), showing teeth springing to different positions.

Press the head of a blow-fly gently between the finger and thumb so as to cause the proboscis to shoot out and the lips to expand, and then, with a fine pair of scissors, cut off the lips when expanded close to the mentum, and place them in a watch-glass containing three or four drops of water. To insure success, proceed thus in three or four instances, until there are several examples of the lips in the watch-glass. Place the watch-glass with its contents in a good light and upon a slip of white paper. Add to the water about two large drops of spirits of wine and two or three drops of strong liquor ammoniæ; mix with a camel-hair pencil, and watch the action of

the ammonia until it has caused a complete diffusion of the red stains within the objects : this it will do in a few seconds. Now transfer the objects to another small vessel or watch-glass containing pure water alone, and wash and press them with the camel-hair pencil. It will be well to change the water a few times during the washing. The ammonia will now be partially cleaned off, but yet the diffused red stains will remain within the objects, and must be removed. To do so, place the objects in a drop of water on a glass slide, cover with a thin glass, and use a tapping pressure with a needle. The reddish fluid will pass out of the objects, and they will become quite clear. Retain a steady and easy pressure with a wire spring clip, and put the slide into a cup of water, and move it frequently with an alternate dipping and draining action, to wash away the expressed fluid and every trace of ammonia. The objects may then, whilst still under pressure, be allowed to become dry, gradually, in the usual way, to prevent any too sudden or too great contraction, and, if subsequently treated with turpentine, they may be finally mounted in balsam.

I have now in view, under a good quarter-inch object-glass, a slide containing seven such lips, prepared a year ago, and on most of them the teeth can be seen with a clearness of definition and a precision of outline that leaves nothing to be desired; and I feel no inclination whatever to attempt any further experiments at improvement by mounting in either gum damar or glycerine : I am quite satisfied with the old-fashioned Canada balsam, and the beauty of the results of the process I have described.

HOW TO MAKE AN HERBARIUM.

(*Continued.*)

By John W. Buck, B.Sc.

In speaking of laying out the specimens, I omitted to give one hint which may be of service : I refer to the judicious use of the scissors. It will sometimes be found advantageous to cut away leaves and blossoms, from what we may call the back of the plant, when there are too many of them, and when they would conceal one another's shape by their number. It has the effect also in many cases of making the specimen look more natural, since, when growing, the branches of a bushy plant do not incommode one another, but spread out equally on all sides. A bunch of berries—those of the spurge laurel, for example—must generally be partly cut away. Sometimes it is well to postpone the operation until the specimen is dry and ready for mounting. But be very cautious that in cutting you do not disfigure the plant, or deprive it of some important feature. Every plant has its characteristic kind of inflorescence, or flower-arrangement, and also of leaf-arrangement, and if you snip away recklessly you will produce effects that will sadly puzzle any botanist who may afterwards look over your collection.

The pressure necessary for the thorough preservation of the plants may be caused by large books laid over the papers, with a few bricks on the top, or by strapping the papers together between two strong boards. The latter plan I prefer, and almost always make use of, because the whole affair can be carried about from place to place if required, or set before a fire to dry quicker, which is often a great convenience. I need hardly say that, however the plants are pressed, they should always be in as dry a place as possible. As regards the amount of pressure to be applied, it should be borne in mind that the object is not to squash the plants but to keep them flat and dry them; and hence, especially with succulents, a too excessive pressure should be avoided. If, however, enough paper be interposed and the specimens well distributed among the sheets, ordinary plants will take no harm under any reasonable pressure.

In transferring the plants, when changing the sheets of porous paper, it will be found advantageous not to lift up each plant by itself and place it on another sheet, but to adopt the following plan. After having lifted away the damp sheets above the plant—which must be done with great care, by turning them slowly back with the right hand while guiding and moderating the operation with the left, which should be held down on the upper surface of the paper you are removing,—place a dry sheet over the plant. Then take up the two uppermost sheets, with the plant between them, carefully invert them, lay them on the pile of dry sheets, and lastly skin off the damp sheet in the same way as before. Even by this method it will not be found easy to keep the blossoms and leaves of some plants smooth, as they are so apt to stick to the papers. All blossoms that are at all troublesome had better be dried separately; and in the case of such as poppies, they should be protected by a couple of pieces of tissue-paper, which should not be removed until the drying process is quite over. The chief difficulty in transference will be found only while the plants are damp, and will disappear entirely as they get drier. The damp sheets should be completely dried before using them again, by exposing them to warm, dry air.

There are several ways of judging when the plants are dry. In the first place, a thoroughly dry plant is generally rigid, unless it be very long and weak. Feeling of the plant by the lips, or placing the hand on the sheet of paper from which it has just been taken, are other tests, but in these cases you must distinguish between coldness and dampness. Generally speaking, you may rest satisfied that if the specimen has been under pressure, with dry and frequently-changed papers, for eighteen or twenty days, it is likely to be quite dry, unless its nature is such as to make the matter doubtful.

Now comes the mounting, which should not be

deferred; as postponing it probably means spoiling the specimens and losing the labels, and certainly means an accumulation of work at some future time. For fixing the plants, some recommend the application of hot glue; but this is very troublesome to manage, and as the operation of carefully gluing a large specimen is rather a long one, the glue is not likely to be very hot when the time comes for fastening it down. Strong gum answers quite as well and is more convenient. To make the gum, take one ounce of picked gum arabic, as colourless as possible, powder it, and stir it with a clean stick or a glass rod in an ounce and a half of cold water until it is dissolved; add a quarter of an ounce of powdered gum tragacanth ("gum dragon"); and lastly, add two grains of corrosive sublimate previously dissolved, along with two grains of sal ammoniac, in one drachm of water. A metal stirring-rod should not be used, as it is apt to discolour the liquid. The latter, if carefully made, is quite colourless, and does not show much, if any be accidentally smeared. (N.B.—Corrosive sublimate is very poisonous, and the bottle of gum containing it should be labelled "Poison.")

To mount the specimens, lay them on a sheet of brown paper or newspaper, gum them carefully all over the back, and then lay them gently on the white sheet in the best position, which you should have previously decided on, and press them down with a clean handkerchief. Use no more gum than is absolutely necessary, and wipe away any excess at once. A good plan with a very large or weak plant is to gum the back of the stem, fix it by a gentle pressure, and then turn up the leaves and flowers one by one, gum them, and then lay them back again in position. Another method, which I remember trying once with a long trailing pimpernel, and which succeeded well, was to gum it on the back as before; shift it, still face downwards, to a sheet of brown paper the same size as that on which I was going to mount it, arrange it as I desired, and lastly turn the white sheet down over it. On lifting it up, it of course brought the specimen away with it. The delicate blossoms which have been separately dried should next be placed in their natural position, care being taken to hide any awkward appearance of a join in the stem. Long plants, too long to lie on one sheet, should be cut in two pieces and these laid side by side; and if the stem be very long and a piece of it be permanently removed, the cut ends should not be brought close together, but it should plainly appear that a piece of the stem is absent. All parts of the plant should be shown as far as they can, and on the same sheet. For instance, somewhere on the dandelion sheet should be shown the globular downy seed-head, and with the strawberry plant the strawberry fruit itself, which latter, notwithstanding its succulent nature, may be easily dried, if not too ripe to begin with. These should not be made to appear as if growing from the same plant as in flower unless they were actually found so growing. In fact, in mounting such parts, nature must be imitated, not contradicted. A few slips of well-gummed paper of the same kind as that you are mounting upon should be kept at hand, with which to fix down stiff stems, which often have a tendency to part company with their sheets.

Labelling should be done immediately after mounting. To keep the names, localities, and dates of the plants while pressing, the particulars may be written on small scraps of paper, which must be transferred each time with the respective specimens whenever the sheets are changed. I have found this plan answer best in practice, as if the entries are made in a note-book there is a danger of afterwards mistaking one plant for another. But however these facts are preserved, as soon as a specimen is fairly mounted they should be transferred to the right-hand bottom corner of the permanent sheet. They may be written thus:

Rhinanthus Crista-galli,
(Yellow-rattle),
Hayfields, near Freshford,
10. 6. 78.
(Collector's name.)

Or printed labels may be obtained with spaces to be filled up. After mounting and labelling, the sheets should be again pressed flat for a day or two.

But the young botanist who does not wish to have a good deal of trouble thrown away, and to see his well-dried specimens devoured by insects, has more work before him yet. Mould is not likely to trouble him with plants which have once been made completely dry. A botanical friend, to whom I am indebted for several of these hints, writes: "At one time, in the very wet summer of 1875, and when I had my press so full that scarcely more than two sheets were between plant and plant, I found, to my disgust, many of them moulding. But I took heart and brushed off the mould with a moderately stiff brush continually till they were thoroughly dry, and then stacked them away between thin dry sheets, and did not look at them again till nine months afterwards, when I found them without a particle of mould. Later on, I cured some of the mould by brushing it off and washing the plants with corrosive sublimate, while they were still in the press. But, by pressing few at a time, or by using more paper, I might, of course, have escaped that; and it does not do to trust to being able to get rid of the mould so, for it discolours the specimens." But all plants are more or less liable to the attacks of insects, and some, as the *Ranunculaceæ*, *Cruciferæ*, and *Umbelliferæ*, especially so. The best preventive is corrosive sublimate. The Rev. Gerard Smith recommends dipping *Ranunculaceæ* (Buttercups) and *Cruciferæ* (Shepherd's Purse, Cuckoo-flower, &c.) before pressing, into a saturated solution of corrosive sublimate in equal parts of rain-water and methylated spirits. A more convenient plan is to paint the specimens with the liquid after they are mounted. For this purpose

a solution should be made of one quarter of an ounce of the sublimate in half a pint of methylated spirit (not "methylated finish"), which is to be applied to the specimens with a pretty stiff brush, taking care that it penetrates all corners and crevices. Every plant should be treated in this way, as it not only prevents the attacks of insects in the future, but entirely destroys any animal life that may be already there. The sheets are then to be again subjected to pressure for twelve hours, after which they will be ready for the herbarium.

It only remains now to arrange the specimens in proper order, but as it is unnecessary to do this until a large number have been collected, we will leave the consideration of it at present. Meantime the sheets should be laid flat in a box, secured from dust, kept in a dry place, and not exposed to the light more than necessary.

A RARE ACARUS.

(*Glyciphagus plumiger.*)

IN the February number of SCIENCE-GOSSIP I announced the capture, for the first time in this country, of that singular and beautiful acarus *Glyciphagus palmifer*, which since that time I have bred pretty freely in confinement. Whenever I have visited the same locality subsequently, I have not failed to search in the hopes of finding what may be called the companion mite, *Glyciphagus plumiger*, but up to a late period unsuccessfully. On my last visit, a few weeks ago, my search was unexpectedly rewarded by finding a single specimen of this species, which is scarcely less beautiful than *Palmifer* itself. I say unexpectedly, because I found it where I did not anticipate doing so. Messrs. Robin and Fumose, the highest living authorities, who have treated of these two species in a most exhaustive manner in the "Journal de l'Anatomie et de la Physiologie" for 1868, say that it is found chiefly in the dust and walls of damp cellars along with *Palmifer*, and there I looked for it without finding it. I eventually found it in fodder in a stable, where I was looking for other mites, and I find that this is the place given for it by Koch, in his "Deutschlands Crustaceen, &c.," published in 1834; and Robin does not omit its being found there.

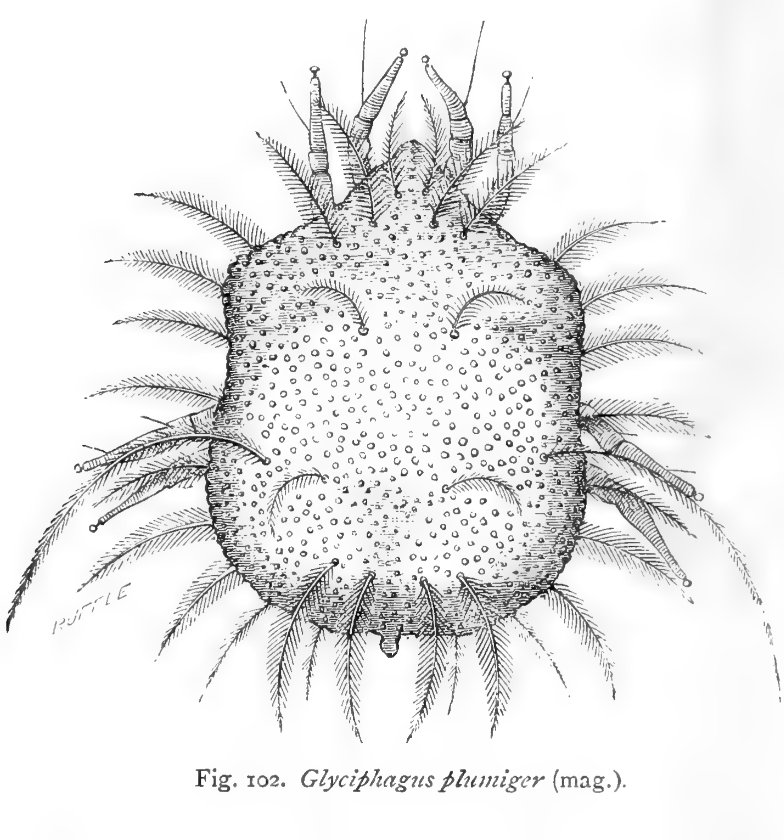

Fig. 102. *Glyciphagus plumiger* (mag.).

I am not aware that there is any record of the capture of this species in this country hitherto, and the late Andrew Murray, in his "Economic Entomology," treats it as not having been yet found here; but Mr. George, of Kirton-Lindsay, informs me that he has in his possession a single specimen which some gentleman in that neighbourhood found, also in hay. As therefore it has been found in two remote parts of the country, between which there would not be likely to be communication, and which are both agricultural, we may, I think, fairly claim this as a British species, although only a single individual has been detected in each instance.

The genus *Glyciphagus* was founded by Hering upon the type of a mite which he found in dried prunes; and taking only the conspicuous characteristics, it may easily be known by the following;—viz., 1. legs of five joints, terminated by a small sucker and very minute single claw; 2. the skin of the back being closely and irregularly plicated, so as to have a soft look; 3. the hairs on the body being either plumose or developed into transparent leaf-like expansions; 4. the females having a small conical projection or button on the anus, the use of which is not at present known. The last two characters are practically almost sufficient for identification.

The leaf-like membranous hairs are peculiar to *Palmifer;* the plumose hairs attain their highest development in the present species, no other known sort approaching it in this respect, and it is to this fact that it owes its peculiar beauty; the hairs, indeed, remind one of miniature ostrich-plumes, as will be best seen by the drawing, which I think may possibly be of interest, because it is carefully drawn from the female, and I am not aware that the female has hitherto been figured. Robin's beautiful illustration is of the male only, and Koch's, which does not state sex, is, contrary to his usual habit, so poorly drawn that it might be either, but I think it is the male. The sexes both in this and *Palmifer* are very different and easy to distinguish. The average length is about 35 mm., and the width about 25 mm.

A. MICHAEL.

NOTES AT THE BRIGHTON AQUARIUM.

THE cunning exhibited by the Angler (*Lophius piscatorius*) in the capture of its living prey is a matter of ancient history, and naturalists, from the time of Aristotle to the present day, have variously commented on its extraordinary manœuvres. The researches carried on during the cruise of the *Challenger* have recently revealed further interesting details respecting the genus, for closely-allied species were dredged in the Atlantic, at a depth of over 2,000 fathoms, with peculiar modifications of structure fitting them for life in the comparative darkness of their habitat in the oceanic abysses.

A fine specimen of the British species has now been on view in a living state in the Brighton Aquarium for many months, affording an opportunity of studying its habits to unusual advantage, and illustrating the general accuracy of the descriptions given by Messrs. Yarrell and Couch in their admirable works on the history of British fishes. The absence of the Angler from aquaria hitherto, has certainly not been owing to any unusual delicacy of structure, for it is a hardy fish and very tenacious of life, but has resulted rather from the difficulty of procuring it a supply of the living prey necessary for its support, and also from the obstinate sulkiness of the creature, which caused it to refuse food when such was forthcoming; matters which have now, however, been successfully overcome. In common with many other fishes, the Angler possesses the power of assimilating its colour to the nature of its surroundings. Placed on shingle, it retained a darkly spotted appearance, which disappeared on its removal to a more spacious tank thickly strewn with sand; it then quickly buried itself in the sand, assumed a pale colour, and was hardly distinguishable from it. A third change, to a dark bluish tint, is perceptible when it lies near the mussels placed in the tank to clear the water. About a week after its capture it was induced to feed, and for some time partook freely of small plaice, bass, and gurnards. A little while back it refused food for some weeks, until a fortunate catch of live herrings furnished a change of diet tempting to its dainty palate. They were at once placed in the tank, and the Angler almost immediately commenced to ply his rod and line vigorously, was soon rewarded with a "bite," and the unwary herrings disappeared in rapid succession. A supply of whiting, plaice, gurnards, grey mullet, and herring, is now regularly placed at its disposal.

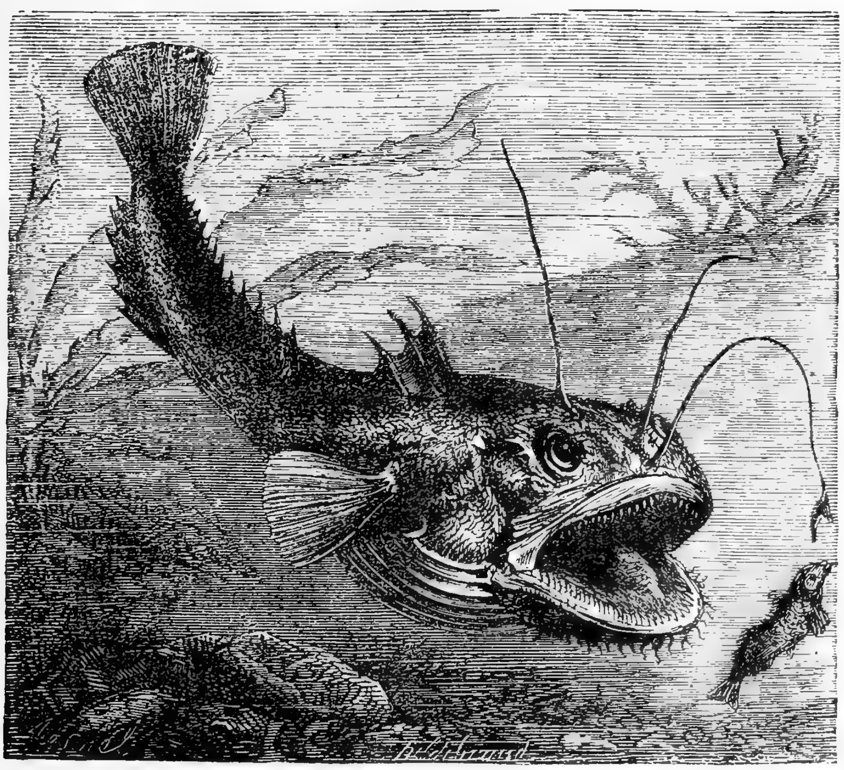

Fig. 103. Angler-Fish (*Lophius piscatorius*), from Taylor's "Aquarium."

The Angler, or fishing frog, is also called wide-gab, frog-fish, and sea-devil. It is a sluggish, slow-breathing fish, generally lying almost motionless at the bottom, and rising but rarely to the surface. The breadth of the body is disproportioned to its length, and the head is large, the mouth exceedingly capacious, and thickly set with minute finely-serrated conical teeth, in addition to the palatal ones; the eyes are large, beautifully bright, and capable of separate movement. The Angler is obviously unfitted, from the unwieldy nature of its body, for the swift pursuit of its living prey, and is, therefore, compelled to resort to artifice. Among the most noticeable of its many peculiarities, the two long, thin filaments affixed to the top of the head are very remarkable. These generally lie out of sight, but, controlled by special muscles, are susceptible of pliant movement, possessing great freedom of action. When desirous of ensnaring the fishes on which it feeds, the Angler elevates these filaments and waves them to and fro in a very energetic fashion. The victims, attracted by the flag, or bait, affixed to the end of the fishing-rod, come within reach of the monstrous wide-gaping jaws, and are speedily seized with one quick upward movement. The head is peculiar, and so jointed to the vertebræ that it is capable of independent action, whilst the body of the fish lies almost motionless. Mr. Farrell states that "they stir up the mud and sand with the pectoral and ventral fins," but this movement has not been observed in the specimen under notice, which appears to conceal its presence as much as possible, lying perfectly still in the same position for many hours, and endeavouring to attract the fishes solely by the action of the fishing-rod. In the deep-sea forms "the fly" was luminous and phosphorescent, and was thus rendered visible to the neighbouring fishes in the dim obscurity of the abyssal ocean depths. Many of the

deep-sea fishes and crustaceans also emit a pale phosphorescent light, and, illumined in the darkness, are enabled to prey on each other, a marvellous instance of adaptation to natural surroundings.

The John Dorey (*Zeus faber*), like the Angler, is also somewhat of a rarity in captivity, but the specimens exhibited in this Aquarium continue to thrive admirably, feeding on the shoals of live sprats and sand smelts sharing their abode. All the tanks, well stocked with healthy inmates, are in excellent order, testifying conclusively to the efficient care and attention of Mr. Lawler, resident curator and naturalist. The sea-lions (*Otaria Stelleri*) are again on view, the lioness having completely recovered from her late serious indisposition. Two young female seals (*Phoca vitulina*) now share the new seal-pond in the conservatory with the two males of the same species, old inhabitants of the Aquarium. A fine specimen of the curious Japanese Salamander (*Triton Sieboldi*), measuring nearly 3 feet, has recently been added to the collections. It is thoroughly acclimatized, existing in fresh water at a normal temperature, and feeding principally on raw beef and liver, which it seems to prefer to the species of fresh-water fishes offered alike for its acceptance. It is a sluggish, weak-limbed reptile, covered with a dark-brown skin, the head and throat being thickly dotted with the glands so characteristic of the "warty newts," and the large pores serving to distribute the viscous matter shed over its exterior are distinctly visible. The mouth is remarkably capacious, and the eyes so minute and dull as to be hardly perceptible. Representatives of the genus were first brought to Europe by Dr. Von Siebold, who discovered them inhabiting a lake on the top of a basaltic mountain in Japan. It is the *Sieboldtia gigantea*, Bonap., and the *Salamandra maxima*, Schelegel, but is now classed with the *Tritons*, and bears a close resemblance to the gigantic American newt (*Menopoma*) of the Alleghany mountains, the generic difference consisting chiefly in the permanence of the gill-slits in the one form, and their disappearance in the adult Japanese species. It is also interesting as being nearly allied to the huge fossil salamander (*Andrias Scheuchzeri*), from the fresh-water Miocene beds of Œningen, in Switzerland, so famous as the "*Homo diluvii testis*" of Scheuchzer, who long maintained it to be a fossil man, and therefore an indisputable relic of the Noachian deluge. His views were put forth with such persistence as to be accepted by many naturalists, until the illustrious Cuvier finally settled the controversy. He obtained permission to remove the matrix, and having previously made a rough sketch of the animal he expected to find, proceeded to lay bare some hidden portions of the specimen, and thus irrefutably proved, in the presence of a group of astonished spectators, that the much-vaunted fossil-man was merely a gigantic salamander.

A. Crane.

THE HABITS, FOOD, AND USES OF THE EARTHWORM.—No. II.

By Professor Paley, M.A.

1. In the first place, they bring up fresh under-earth to the roots of the grass: this useful office is done on a much larger scale by moles, which live on worms, and throw up those heaps of well-crumbled mould which are intended to relieve at intervals their tunnels, made a few inches below the sod. We know that farmers, who generally dislike what they regard as superfluous trouble, and rarely possess much scientific information, will pay a mole-catcher considerable sums for the destruction of this harmless and even useful creature, which they seem to regard as a kind of rat! If they would pay a tenth part of the money to send into a meadow a small boy with a small rake, and get the mole-heaps spread over the grass, they would get a third more in their crop of hay.

2. All grazing animals eat a great quantity of earth. They cannot avoid swallowing the worm-casts, and they like to do so. Earth seems comfortable to their insides, and it is certain that they enjoy it. I used to ride a horse which, being regularly fed on hay and corn, and not turned out to grass, pined for a little dirt. Finding out this, I sometimes let him go to a hedge-bank, slackened the rein, and watched him scoop out with his tongue earth enough to fill a pint-pot. This, I think, is the reason why a horse so often stirs up the mud in a pond with his hoof before drinking. Many horses will paw the water even when passing a clear stream, giving their riders the fear that they want to lie down in it. Some races of American Red Indians eat earth. The fact is attested by Humboldt and others. It is said that the Jamaica negroes will do this when other food is deficient or not procurable.*

3. Seeds of trees are dragged by worms into their holes, and there germinate. This is most commonly the case with the seeds of the ash and the sycamore, both of which have their winged appendages set slightly on one side, like the sails of a windmill, or the screw-propeller of a ship, so that they are carried by the wind and fall aslant at some distance from the trees. I have repeatedly drawn both of these seeds out of worm-holes, after they had begun to germinate. The fact is established by the carrying down of seeds, strewed on the surface, by worms kept in a pot. There can be no doubt, therefore, that it is one of the provisions of nature for the propagation of vegetable life.

If you examine a worm-cast, you will find that it is composed partly of the earth ejected from the hole, in small clods, slightly coherent (probably from some admixture of the slime), and partly of excrementitious matter. The latter is easily distinguished by its

* See "Races of Mankind," by Robert Brown, vol. i. p. 290.

granular and mammillated appearance, somewhat resembling mouse-dirt. It does not seem to be thrown out of the hole mixed with the rest of the earth, but it is deposited separately, often in considerable quantity. If you crumble it when dry, you will find it full of vegetable fibre, which has the appearance of undigested moss, or small blades of dried grass, curiously rolled up in rather hard little pellets, which do not easily crumble with the rest of the earthy excreta. It is clear, therefore, that the dirt of the lob-worm is part vegetable, though the greater part of it is simply earth. If the excreta are dissolved in water, the vegetable *débris* is still more easily collected on the top of the muddy sediment. It is not surprising, from the nature of their food, that the richest earth is generally most full of worms. They are scarcely ever found in digging in sand or gravel, and this is the reason why you so rarely meet with mole-hills in sandy or pebbly soil; viz., because these clever little creatures find out that worms are not to be had there for their trouble in boring. How the worm ejects these little pellets on the outside it is perhaps impossible to say. The head is always protruded first from the hole; can it be that the pellets, after being discharged, are conveyed to the surface by some special process? Or does the worm emerge entirely from its hole during the night? The excreta, however, are never found apart from the worm-cast covering the hole.

I enclosed three large worms in a flower-pot of moist earth, covering it so as to prevent their escape, and occasionally sprinkling a little water on the surface. I found, as I had expected, the next morning that a hole had been bored, opening to the surface, and the bits of earth were thrown out, but not a particle of the excreta. I then placed some leaves, with bits of stick and string, on the surface of the pot, in order to see if they would be used as a plug for the hole.

I was desirous also to ascertain if the worm came to the surface to feed, or if it in any way disturbed or fed on the leaves, the positions of which and their condition I took note of. I found that the bits of string and the leaves had been all moved, and some of them drawn into the aperture of holes they had opened against the *sides* of the pot; also that the leaves were in part nibbled away, if one may use such a term of a creature which has only some power of sucking up or sucking off. It seems certain then that worms swallow both earth (rich earth in preference to poor or sandy earth) and *also* fibrous vegetable matter.

Every effect that the worm leaves visible on the surface seems done at a time when its enemies, the birds, are not abroad. How a blind creature can tell night from day seems surprising; possibly the warmth of the sun, or the dew at night may serve it for this end. By keeping one or two worms in a flower-pot, I once or twice found one partly exposed. It was passing, by peculiar jerks made, with intervals of rest, from one hole into another. From this I suspected that, as in a rabbit-warren, the same creature has several holes communicating with each other under ground.

To ascertain this, after keeping the worms fo some time in a flower-pot, I let them escape, and by drying the earth I was able to dissect it so as to expose all the galleries and passages. I found these very numerous, and towards the bottom of the pot containing portions of leaves which had been drawn down for food. Grains of wheat and other seeds had been carried down to the bottom, and it seemed to me that the worms had fed on the tangled roots which these seeds had sent out through the whole thickness of the earth. The *excreta* in some cases were adhering to the sides of the pot. I think they must have some way of conveying it or pushing it out of their holes, as birds are said to eject the dirt of the young nestlings. I think, also, that it is got rid of as soon as deposited. For, though worms are very shy of making themselves visible by day, it is common to find worm-casts so moist and fresh that they have evidently just been thrown up. This is the case with mole-heaps; but I never saw, and I never met with any one who could say that he had seen, the earth actually being thrown up. The mole, like the worm, is evidently very sensitive to the tread of a foot. Both remain quiet when they feel the vibration of the ground.

Worms by no means invariably draw into their holes leaves or bits of sticks, or cover them over with pebbles. The reason of their doing so at all is therefore the more obscure, since it is not a necessity. Very often the hole is marked only by the little heaps of earthy *excreta*, and however carefully you remove these, you will find the hole itself is completely stopped. They nibble off the ends first, and then pull the remainder down lower, till little more than the stalk and mid-rib is left. And a little observation will show that the leaves have really been devoured, and have not rotted away in the moist earth. This fact I ascertained to a positive certainty by repeated supplies of dry leaves put into the flower-pot, the whole being clean eaten up except short portions of the stalks. It seems then that a very large part of the decaying vegetable matter in gardens is consumed by the numerous lob-worms, for they are greedy eaters, though they seem to do no harm to growing plants, even if they do eat some of the fibrous roots. In this respect the worm resembles the mole and the dung-beetle, which never leave the hole to the upper surface open to the air, as most of the burrowing animals do.

Nevertheless, it is certain that worms do feed on leaves or bits of stick drawn into their holes. My grass-plot in late autumn quite bristled with the tufts of fallen willow-leaves (the weeping willow), but in a few weeks they had vanished, entirely consumed by

the worms, which had drawn them there for food. I laid about a dozen of these dead willow-leaves on the top of my flower-pot, and in a day or two they were all drawn in (always with the stalk uppermost), and so gradually devoured. I put in a fresh supply, and one evening, on gently removing the cover, I detected a worm with its head affixed, or stuck by the slime, to one of the leaves. It did not stir in the least, and seemed perplexed by the stalk of the leaf resting against the side of the pot. But in the morning the clever creature had turned it round, and there was the stalk-end sticking up in the worm hole! It had turned it completely round, and whereas it had lain like a bar across the hole, it had contrived to pull in the narrow end. All this is evidently done by the creature *feeling* the position of the leaf. But to turn it when it is the wrong way is a process that resembles a kind of low reasoning rather than mere instinct —if, indeed, we have any right to regard the two motives of action as essentially distinct.*

Not only leaves were thus drawn in and devoured, but grains of wheat, canary, and rape-seed, sprinkled on the top of the earth in the flower-pot, were gradually carried down, and soon entirely disappeared, so that after a few days not a single seed was to be seen. I tried bits of stick, bread-crumbs, scraps of ginger-bread, and biscuit, but they were not much noticed, though the sticks were generally moved. After a few days, the seeds came up, thus affording a pretty conclusive proof that one province or function of the earth-worm is to promote the growth of plants by burying seed which might otherwise perish, or be picked up by birds.

In the above purely popular account of the earth-worm, no attempt has been made at a scientific description.

The anatomy of the earth-worm, and the organs and process of reproduction, which are extremely curious, are very fully explained in an elaborate paper by Sir Everard Home, Bart., in the "Philosophical Transactions of the Royal Society" for 1823, part I, pp. 140—151, illustrated by four plates, xvi.—xix., containing magnified diagrams of the various internal parts.† These are, to enumerate them briefly, a head with a distinct mouth, having some serrated apparatus, not very unlike teeth, a brain (cerebral ganglia), spinal cord, artery, with six lateral lobes or cells on each side, containing red blood, perhaps equivalent to a series of hearts, an œsophagus, crop, gizzard, intestinal canal, and anal aperture. The creature is divided through its entire length into compartments, containing eggs enclosed in membranous bags. Near the middle is a thick swollen ring * of rather darker colour. This is connected with the generative process, and appears to have given rise to the popular opinion that a worm cut in two will "mend itself," or grow into two worms. The roughness which is felt on handling a worm arises from minute bristles which grow out of the rings, and doubtless assist the creature in its movements. The slime exuded is not nearly so tenacious as that of the snail or the slug, but it probably facilitates the progress of the worm through its labyrinthine home, and it appears to impart some solidity both to the walls of the passages and to the substance of the *excreta*.

* Sir Emerson Tennent, in his "Natural History of Ceylon," p. 90, relates, as a singular instance of the sagacity of an elephant, his turning sideways a log, which he was carrying balanced across his tusks, so as more easily to make his way through the trees.

† See also Dr. Nicholson's "Manual of Zoology," p. 209, ed. 3, and especially Prof. Huxley's "Manual of the Anatomy of Invertebrated Animals," pp. 219—226.

* In a full-grown worm, a part of the body into which more or fewer of the segments between the twenty-fourth and thirty-sixth inclusively enter, is swollen, of a different colour from the rest, provided with abundant cutaneous glands, and receives the name of *cingulum* or *clitellum*.—Huxley, p. 221.

THE DEVELOPMENT OF SPECIALLY ADAPTIVE APPLIANCES IN PLANTS.

THERE is perhaps no branch of scientific knowledge which has received greater stimulus of late years than that part of physiological botany which

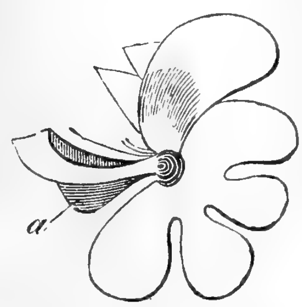

Fig. 104. Flower showing stamens in juxtaposition with style in keeled lip *a* (nat. size).

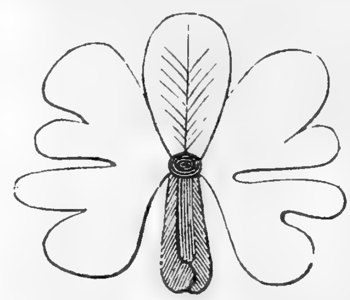

Fig. 105. Flower showing the deeply-cut petals (nat. size).

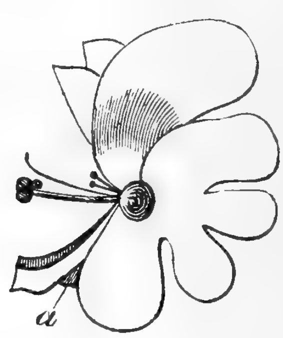

Fig. 106. Flower showing the dropped keel *a* (nat. size).

refers to the colours of flowers and the origin of their forms. The observations of Drs. Darwin and Müller, of Sir John Lubbock, and others, have supplied material for modern scientific thought to explain the whole scheme of vegetable creation, and attempt is now even being made by some to connect with the development of vegetable life the colour sense of the animal world, including that of man himself.

A writer in *Cornhill Magazine* for May has striven to show that all irregular-shaped flowers, especially those which combine with colour attractive-

ness, sweet-scentedness, such as the *Labiatæ*, are the most recently evolved, and that with this development have been correlated the colours of insects. Also similarly is it so in the case of coloured fleshy fruits and the development of the colour sense in the higher vertebrates to suit their frugivorous tastes. And it is interesting to remark that these higher stages have been observed to be intensified even in historic times, as in the case of the human race; for the mere mention of colour itself—that is to say, in any sense of appreciation—is entirely absent from the most ancient literary works which we possess.

and also of both colour and the colour sense in the vegetable and the animal world.*

A recent observation of my own upon a member of the *Scrophularineæ* led me to the idea of communicating the foregoing remarks as introductory to those I am about to make in reference to the development of floral adaptations in relation to fertilization.

Unquestionably the prime important function of life, both vegetable and animal, is the securing of means for perpetuating its existence, but in an improved direction. Therefore, if in the former division of the organic world any usual acquisition be

Fig. 107. Raceme of *Schizanthus papilionaceus* (nat. size).

These views may be looked upon as more or less fanciful, but nevertheless it is difficult to say they are vain speculations, and they combine, moreover, to harmonize with other great principles of evolution already propounded. But I will not dwell upon this theme here, pregnant as it is with fascination and interest. Readers of SCIENCE-GOSSIP will find elsewhere matter which sets forth the views affecting the development of flowers, constituting the Phanerogams,

occasionally wanting pertaining to these means for reproduction, it often happens that some organ or organs is or are so modified as to supersede that inconvenience. For instance, the plant *Ajuga ophrydis*, of South Africa, has flowers much resembling those

* *Vide* "The Colours of Animals and Plants," by Alfred R. Wallace, in *Macmillan's Magazine* for September and October, 1877; "The Origin of Flowers," in the *Cornhill Magazine* for May, 1878; and J. E. Taylor's recently-published "Flowers: their Shapes, Perfumes, and Colours."

of an orchid, and it has been suggested that this acquirement may have been a necessary modification, in order to assist, by its assumed attractive power, in the means for fertilization, in the absence of some other alluring property, such as nectar; and, as Mr. Wallace adds, the supposition is rendered all the more probable considering that this is the only species of the genus in South Africa.

I may now be permitted to call attention, for the first time, I believe, to the special adaptations for cross-fertilization in another irregular-flowered species, viz., *Schizanthus papilionaceus*, alluded to above. This plant belongs to the sub-order *Salpiglossideæ* of *Scrophularineæ* (according to Bentham), forming an intermediate section towards which the Figworts and Nightshades approach each other. The inflorescence of *Salpiglossideæ* differs from the other two sub-orders of the order in being entirely definite or centrifugal. The plant here mentioned formed one of the two subjects selected by the Science and Art Department for diagnosis in the "Honours" grade in Botany this year; and there cannot be two opinions that the corolla, which makes the flower so conspicuous and handsome, is particularly easy to describe. The inflorescence is a large loose panicle, or, as it is definite, it may perhaps be more properly defined as consisting of true racemes, arranged upon a loosely-branched floral axis: the individual flowers are somewhat papilionaceous, as its specific name indicates, or rather more correctly termed, perhaps, papilionaceo-labrate, the upper or posterior portion of the limb being perfectly erect, whilst the lower anterior, which is three-lobed, forms a horizontal "keel," in which are the two long perfect stamens (fig. 104). The petals of the combined whorl are more or less deeply cut (fig. 105); hence the signification in the prefix to the generic name. Similarly we have it in corolla and name in *Schizopetalon* belonging to the cruciferous order. The lovely flowers of *Schizanthus papilionaceus* strike one for the first moment as those of an orchidaceous plant, and doubtless the cause of such a development has a similar purpose to fulfil as that of *Ajuga ophrydis* and other peculiarly abnormal corolline forms.

Now it will be seen that the position of the two perfect stamens in the keeled lip are in juxtaposition with the style (fig. 104). But the extreme condition of proterandrism appears to prevent self-fertilization, whilst another attendant condition in the way of insect adaptability must evidently favour cross-fertilization. This lower keeled portion of the limb is, as I pointed out before, horizontal. When the plant was first brought under my notice, I observed that whilst the two developed stamens in some cases had closely approached the style, the "keel" of those particular flowers had dropped down (fig. 106). I also observed that the anthers in those instances had discharged their pollen; in other words, they had finished their work. Not dreaming of such a thing as inherent irritability, I merely shook the flower-stalk, with its numerous flowers, violently in my hand, to notice if motion had anything to do with the bringing about this changed position of keel and stamens. All remained the same, and so at present did the mystery. My books at home afforded me no help, neither did persons of whom I sought information, until I reached a professional gardener, and seedsman,* an old acquaintance, of some half a dozen miles distant, who, to my utter astonishment, was cultivating *Schizanthus papilionaceus* in pots for the conservatory in abundance! It was an exquisite floral sight. Having this further opportunity, I examined the flowers again. The "keel" of one of them was slightly touched when we perceived that the two stamens instantly jerked upwards out of it, and closely approached the style; at the same time the anther-cells burst, expelling the profuse pollen with great elastic force; simultaneously also the "keel" dropped down as if upon a hinge.

The problem was now fully solved, and there remains but little for me to add. The points of consideration in the flowers of this plant as affecting a condition opposed to self-fertilization may be summarized as follows:—(1.) By the unequal development of the stamens and pistil (proterandrism). (2.) By the existence of a large area of attractiveness provided by the combined numerously flowered inflorescence, and peculiar structure of the individual flowers. (3.) By the need of mechanical stimulus to disturb the concealed perfect stamens.

The "keel" forms an alighting stage for the insect, which swings down under the weight of its body, and, especially its underside, becomes at the same time dusted over by the discharged pollen. As the position of the style is parallel with and close to the upper side of the "keel," the insect's body would naturally come first in contact with the stigma of any foreign flower the insect may visit, and if the stigma be in a state far enough advanced, fertilization would be effected. Probably no plant, orchids excepted, affords a more interesting subject for study and such combined appliances, emphatically promoting the end which incontestably supports the Darwinian view that "Nature abhors perpetual self-fertilization."

Slough. GEORGE NEWLYN.

P.S.—Since the above has been in type, the Rev. G. Henslow has kindly communicated to me some interesting details of similar observations he has made in the floral structure of a few leguminous plants.—G. N.

HOW TO DESTROY ANTS.—If Mr. George Pearce uses a mixture in equal parts of calomel and powdered white sugar, he will speedily rid himself of the ant nuisance.—*Samuel Woods.*

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* Mr. Elliott, of Bray Wick, Maidenhead, who informed me that *S. pinnatus* was very similar to *S. papilionaceus*, both in the structure of the flower and habit of growth.—G. N.

BOTANICAL WORK FOR JULY.

SUPPOSE any one absent from England for many years, were to be landed, or placed on our shores about the early part of summer, but to be totally ignorant as to the month of the year, rambling along the lanes and fields, and seeing a profusion of the various though elegant species of *Veronicæ*, he would naturally say, "This must be the month of May!" So, in like manner, a little later in the season, finding the willow-herbs scattered here and there with a lavish hand—would he not exclaim: "This is July!"?

Our subject this month then must be to work up the willow-herbs. We trust we shall make them so simple and plain, that our meaning or descriptions cannot be misunderstood, but make a large addition of new forms to our herbaria of curious and distinct varieties, which have hitherto been passed over:—

SECTION I. *Corolla irregular, wheel-shaped* (*rotate*).

In this section we have only one British species, the handsome Rose-bay, *Epilobium angustifolium*, Linn., with its garden variety, *E. brachycarpum*, Leight.

SECTION 2. *Flowers regular, campanulate, or funnel-shaped.*

Note.—By carefully observing the characters of the following *divisions*, it will be easy afterwards to recognize the different species and varieties, without having the *least doubt as to thier identity*.

DIVISION I. *Stems terete, stigma 4-cleft.*

1. *Epilobium hirsutum*, Linn. Whole plant very hairy. *L. opposite, oblong-lanceolate;* flowers large, showy, rose-purple, often $\frac{3}{4}$ in. diameter; the four lobes of the *stigma curled backwards* (revolute); buds *erect.*

2. *E. parviflorum*, Schreb. (*E. molle*, Lam., in Fl. des Environs de Paris). A much smaller plant than No. 1. Stigma lobes short, *not bent back;* L. *alternate;* flowers $\frac{1}{3}$ in. diameter, rose-purple, more or less pubescent.

Var. *a. E. rivulare*, Wahl. Often quite *glabrous* or smooth; not unfrequent on the borders of shallow brooks.

Var. *b. E. intermedium*, Merat. Covered with fine *silky hairs.* L. all *alternate.* Frequent by stagnant ponds, &c.

Var. *c. E. molle*, pubescent. L. in threes, verticillate (whorled); more rare than the above. By the river at Kew.

3. *E. montanum*, Linn. L. quite *smooth*, except veins, oblong-*ovate;* buds *drooping;* flowers pale purple.

Var. *a. E. gracile* (Fl. des Environs de Paris). A smaller plant, and much *branched.* L. *oblong*, on short stalks; flowers all drooping gracefully.

Var. *b. E. verticillatum*, Thuret. L. small, whorled in the lower part of the stem.

Another variety, though probably not a permanent one, with *white flowers*, is occasionally found in plantations.

4. *E. lanceolatum*, Sebast. Very rare. L. *stalked*, *lanceolate*, narrowed to an *entire base;* buds drooping, *ovate.*

DIVISION 2. *Stem with raised lines, or 2 to 4 angles, stigma entire, club-shaped.*

5. *E. tetragonum*, Linn. Stem with 4 *unequal angles;* L. *strap-shaped*, smooth, stalkless; *buds erect.* A *much-branched* species.

Var. *a. E. obscurum*, Schreb. L. *tapering from* a rounded base, *lanceolate*, not shining above. We regard this as a true species, as do most continental authorities. (*Vide* Gren and Godron.)

6. *E. palustre*, Linn. Stem 1 foot, simple, *with 2 lines of hairs*, seldom branched. L. mostly *opposite*, *downy* on upper surface, smooth beneath, except midrib, *lanceolate*, with *wedge-shaped* base. Flowers small, in leafy clusters.

Var. *a. E. pubescens*, Cuss. Whole plant covered with downy hairs, and densely branched.

Var. *b. E. ligulatum*, Baker. L. *toothed;* style simple; partakes much of the characters of *palustre.*

In this month we must also keep a look-out for the Loosestrife, *Lythrum Salicaria*, Linn. Being so well known, it is not needful to describe it particularly; first, let us observe, Hooker, in "Student's Flora," notices two varieties growing by the Thames, at Kew,—a long-styled and short-styled plant. These have recently attracted considerable attention, by observers of the modes of fertilization, and justly so, for, even viewed in this light, they are full of instruction.

In the Floras of France, *three* varieties are enumerated. Having occasionally detected these, we mention them with confidence,—it may throw a new charm upon an old face to many of our readers.

1. *L. alternifolium.* Floral leaves alternate (rarement toutes les feuilles alternes—Fl. des Environs de Paris). We have not seen the *whole of the leaves alternate;* as here described. Flowers *pink.*

2. *L. verticillatum.* L. in threes, verticillate, *styles long.* A smooth plant, slender, with narrow leaves. Flowers *bright* or pale pink.

3. *L. pubescens. Style short*, a large coarse plant. Flowers dark dull-purple, very hairy (Plante très-pubescente, or plant very pubescent). Fl. des Environs de Paris.

The Sundews (Drosera) are becoming just now so conspicuous that we may be pardoned by a passing though brief reference to one of the species. Probably *Drosera obovata* (Mert. et Koch) has hitherto attracted very little attention, from the fact, it is supposed to be a hybrid betwixt *D. anglica* and *D. rotundifolia*, but any one knowing the true plant, and observing its habit, style, and capsule carefully, will never so regard it.

D. obovata, Mert. and Koch. L. truly *obovate*,

broader at the summit than the type. Style *notched*, capsule *half as long* as the sepals.

Fig. 108. Leaf of *Drosera anglica*. Fig. 109. Leaf of *Drosera obovata*.

We give an engraving of the leaves, natural size, of both the type and variety; this may help in its identification.

F.

MICROSCOPY.

Diatomaceous Material.—Mr. Clark, the Secretary of the San Francisco Microscopical Society, announces to diatomists that the Society is now enabled, by the kindness of the State Geological Survey, to offer return exchanges of the Pacific Coast diatomaceous deposits *on receipt* of any valuable microscopical material.

The Quekett Microscopical Club.—We have received the latest issue of the Journal of this vigorous society, containing a description by Mr. J. G. Waller, of a new British sponge, of the genus *Microcionia;* a paper on "The New Autographic Process," by Mr. A. Cottam; an abstract contribution by M. M. Hartog, B.Sc., on "The Investigation of Floral Development"; and a "Record of the Proceedings of the Meetings of the Club."

A Wet Process of Mounting in balsam is well described by Mr. Stokes, in the May number. I have for some years used a similar method, and which for large and whole insect preparations I prefer. It is difficult to set out all parts of an insect, and at once apply balsam without again disarranging your work. I therefore proceed thus:—The object having been sufficiently soaked in potass to soften it, and washed well in distilled water and freed from dirt, &c., I place it for a minute or two in alcohol, then lay it out on a piece of glass in a little alcohol, cover with another piece, press and tie with cotton, and throw into a bottle of alcohol—the longer it stays here the less likely to alter form,—take it out after a day or two, put into turpentine and again brush; it may be then mounted after a few minutes' soaking in the turpentine, but I generally prefer to tie it up again and throw it into turpentine for a few days. To mount, lay object on slide on some balsam (liberally), and cover with thin glass, which hold down lightly with clip of some kind; boil, until a portion of the balsam around the cover, taken on the end of a needle, is tolerably stift. There may be very many bubbles, but if they only arise from vapour of turpentine, and the balsam is not too hard, they will all go out in a few days. The boiling need be for a very short time, and a little practice will make perfect work. It is the simplest method of balsaming I know of, much more easily managed than damar.—*An Old Mounter.*

Canada Balsam in India.—An experience of twenty years enables me to give a satisfactory answer to the inquiry of H. F. Blackett as to the heat-resisting power of Canada balsam in India. I have brought back with me many specimens, mounted in that medium, which I took out with me twenty-five years ago, and they are as perfect as ever they were. My experience of mounted slides is as follows, though it may possibly not accord with that of others. Canada balsam stands well, and so (and I was much surprised at the fact) does sealing-wax varnish as a surrounding cement; though much, no doubt, depends upon the quality of the sealing-wax. The black asphalt cement is apt to run in under the thin glass. I have some specimens surrounded with this material entirely spoilt, while a few have stood well. All chemical preparations are spoiled by the climate. —*C. S. P. Parish.*

Plant-Crystals.—Mr. Hammond's paper, in the June number of Science-Gossip is likely to lead to valuable microscopical work. Now, microscopists need no longer be advertising for good materials for the preparation of interesting slides, for they everywhere surround us, in our walks through the green lanes and excursions to the conservatory, and to the shops of the druggists. In the latter may always be had guaiacum bark and quillaja, in both of which the long crystal prisms exist in great abundance and beauty; while the short prismatic crystals are very plentiful in most of such common plants as the Leguminosæ, and in the testa or seed-skin in the Elm, Black Bryony, and Scarlet Pimpernel. All these crystals are admirably fitted for experiments on the polarization of light. The sarsaparilla of the druggists affords true raphides; but these do not polarize light well, nor do the cystoliths or other sphæraphides. All of them are figured either in Science-Gossip, May, 1875, or in the *Monthly Microscopical Journal*, December, 1873; and it is understood that Professor Lionel Beale will devote two plates to all these interesting crystals in the forthcoming new edition of his great work, entitled "How to Work with the Microscope."—*G. R.*

ZOOLOGY.

The Hemipterous Fauna of St. Helena.—At a recent meeting of the Zoological Society of London, a communication was read from Dr. F. Buchanan White, entitled "Contributions to a Knowledge of the Hemipterous Fauna of St. Helena, and speculations on its origin." In the first part of his paper the author, after briefly noticing what was known with regard to the Fauna and Flora of that remote and interesting oceanic island, and mentioning the various theories that had been brought forward to account for their origin, discussed the difficulties of the animals, and argued that they had evidently been derived at a remote period from the Palæarctic Region by way of Madeira, the Canaries, and the Cape de Verde Archipelago. In the second part of his communication Dr. White described the Hemiptera collected in St. Helena by the late Mr. T. V. Wollaston, during the recent visit of that naturalist to the island. The collection included thirty species, of which five were probably introduced; one appeared to be indigenous, but seemed identical with European species; and the remaining twenty-four were regarded by the author as new and peculiar to the island. Seven new genera and one new sub-genus were created for the reception of ten of the species, the rest, with one exception, being referred to European genera.

Testacella haliotoidea in Jersey.—This slug, though recorded as occurring in the sister isle of Guernsey, seems not to have been reported from this island. On the 21st of April last, about 9 a.m., I observed a specimen crawling at the foot of a dry bank, after rain. It carried a prominent oval laminated shell, of an ashy-white colour, about ½ an inch in length by ¼ of an inch in breadth, just in front of the hinder extremity. But it appears that an intelligent observer, R. Macdonnell, Esq., by whose kindness I have since seen a second specimen, has noticed it occasionally, for several years, in his garden, about half a mile from the other locality. Whether it is indigenous in Jersey, or imported from France with soil, I must leave to those who, unlike myself, are learned in the history of mollusca.—*Martin M. Bull, Jersey.*

The Cuckoo at Night.—On the 24th of May I heard the note of the cuckoo at 2·15 a.m. The night was very dark, and it was raining heavily, yet the cuckoo was singing as loud and as cheerfully as it would in the daytime. Is it usual for the cuckoo to sing during the night?—*A. M. McA., Stoke-on-Trent.*

Irish Wolf-Dog.—Lord Talbot of Malahide formerly had a dog said to be the Irish Wolf-dog; he probably can give "L. M." the information he requires.

BOTANY.

Meyenia erecta.—It must have been obvious to Science-Gossip readers that the name "Mergenia erecta," which headed a paragraph in the June number, page 139, and which had reference to fertilization adaptability, was a misprint for the above. Acanthaceæ, to which natural order this plant belongs, approach Labiatæ and Verbenaceæ, Scrophularineæ and Bignoniaceæ in the irregular anisostemenous corolla: they differ from the latter two orders in the æstivation of this whorl, and by the absence of albumen. All these groups of irregular-shaped flowers are specially adapted for insect fertilization, and, as regards the favoured theory of the origin of species, they doubtless constitute the last link in the developed series of flowering plants. I am inclined to suggest that there is a field open in connection with the investigation and study of the floral structure of these groups, and that special attention devoted in this direction will be attended with fresh interesting discoveries.—*George Newlyn.*

Epilobium angustifolium (Rose-bay Willow-herb). In "Flora Lapponica," Linnæus describes the hut of the Laplander encircled with the tall stems and elegant blossoms of this species; he goes on to state they in state emulate the palaces of the gods. The Swedes call it *Himmelgræs*, or "herb of heaven." The only true wild form found in England is the *E. macrocarpum*, Steph., whilst the one often found in cottage-gardens is the *E. brachycarpum* of Leighton's "Fl. Shropshire"; they are quite distinct. —*R.*

Destruction of Rare Plants.—As this sad work is still going on, Mr. E. D. Marquand deserves the thanks of all botanists for his judicious remonstrances, in the June number of Science-Gossip, against the rooting out of the New Forest such interesting species as *Spiranthes æstivalis* and *Pulmonaria angustifolia*. It would be a libel to attribute such wanton destruction to botanists, since it is done by mean dealers. But it unfortunately happens that the destruction is too often encouraged under the pretence of science, especially by some of our provincial societies offering rewards for the best collections, as if mere collectors had any pretence to be regarded as botanists or zoologists. If the rulers of such societies had any intention of encouraging, by rewards of money or otherwise, the promotion of botanical or zoological science, that might be more easily and effectually done by proposing investigations of the species and intimate structure of common plants and animals. For example, the species of the Wild Roses, Brambles, Willows, Sedges, Grasses, &c., would afford excellent exercises; and so would the examination of the intimate structure of the glands, hairs, pollen, and distribution and significance of raphides and other plant-crystals, &c. It is really

aggravating that Mr. Marquand should have been called on to protest now against a crying evil; especially as it has long since been denounced by Professor Gulliver and others in *Nature*, May 22, 1873, and in the Nineteenth Report of the East Kent Natural History Society; and all this about the same time that Professor Babington and other eminent botanists were protesting strongly but ineffectually in the same cause.—*Q. F.*

A Glass-eating Lichen.—My friend Mr. Johnston-Lavis's lichen seems probably of more interest than the unpainted surface of much old glass. If this lichen—for lichen it very probably is—really has the power of dissolving glass, it is certainly of the very deepest interest. I quite agree with the discoverer in setting aside the "workman" theory; but I much regret that the extent to which the figures are magnified is not given, the method of drawing not stated, and the "various re-agents" used to remove the growth not named; for in Mr. Johnston-Lavis's paper I see no evidence that would make me attribute a solvent power equal to that of hydrofluoric acid, to this lichen, rather than believe in the simpler hypothesis that it is filling up by its growth previously existing holes. I hope my friend will prosecute this inquiry, and produce some more decisive evidence one way or the other.—*G. S. Boulger.*

Old Plant-Names.—In answer to Mr. Henry F. Bailey, I may say that Dittany does not occur in Turner's "Libellus de re Herbaria" (1538). In Gerard's "Catalogus" (1596), *Dictamnum cræticum* and *fraxinella* are mentioned, and in the second (1599) edition, the former is called "Dittanie of Candie," and both "Fraxinella Bastard Dittanie" and "Fraxinella altera, Great Bastard Dittanie," are recorded. The *Dictamnum cræticum* is described on p. 651 of Gerard's "Herbal" (1597), and is identified by my friend Mr. Benjamin Daydon Jackson, editor of the "Catalogus" and "Libellus," with *Origanum dictamnus* of Linnæus. *Fraxinella* is described on p. 1065 of the "Herbal," and is, according to the same high authority, *Dictamnus albus*, L., whilst *F. altera* is on the same page of the "Herbal," and is *Dictamnus fraxinella* of Persoon. *Dictamnus* belongs to the Rue tribe. It is remarkably inflammable, owing to its oil-secreting glands. *D. albus* is now commonly known as Dittany. *Origanum* belongs to the Labiates, and our Marjoram is a species of this genus. On p. 61 of the "Herbal," and in both editions of the "Catalogus," Gerard also mentions "Pseudo-dictamnum, Bastard Dittanie," which Mr. Jackson makes *Ballota pseudo-dictamnus* of Bentham. Garden Rue is, and was in Gerard's time, *Ruta graveolens*, though then known as *Ruta sativa*. I am not at all sure about the Mandrake, but the probabilities seem in favour of a solanaceous plant, rather than the White Bryony, which is the popular name by which *Bryonia dioica* is distinguished from *Tamus communis*, the Black Bryony. Tournefort named the genus of Solanaceæ, now known as Mandragora, of which the species *officinalis* is commonly known as the Mandrake. "The insane root which takes the reason prisoner," is often said to be the Dwale, or Deadly Nightshade (*Atropa Belladonna*). I may refer Mr. Bailey to the Rev. H. N. Ellacombe's "Plant-lore of Shakespere," an excellent work, which I have not by me at present, and I may perhaps also take this opportunity of calling attention to the existence of a "Turner Printing-Club," for reprinting early works on British botany, under the superintendence of Mr. B. D. Jackson, of 30, Stockwell-road, S.W. In Gerard's "Catalogus," and the "Herbal," p. 274, the Brinjal, Aubergine, or Egg-plant of Asia, *Solanum Melongena*, L., is mentioned as *Mala insana*, Mad or Raging Apples. I take this opportunity of publishing, for the justification of our early authors, their meaning in the various Maidenhairs. The true Maidenhair is *Adiantum capillus-veneris*. Possibly the foliage of *Thalictrum minus*, the Lesser Meadow Rue, was sometimes mistaken for it. The common or English Maidenhair is *Asplenium Trichomanes;* the Black Maidenhair is *Asplenium Adiantum-nigrum;* the White Maidenhair is *Asplenium Ruta-muraria*, the Wall-rue Fern; and the Golden Maidenhair is the moss *Mnium hygrometricum*, also called Little Goldilocks. The Goldilocks is *Ranunculus auricomus*.—*G. S. Boulger.*

Bible Plants.—An interesting little volume with this title, by John Smith, ex-curator of the Royal Botanic Gardens, Kew, has just been published by Hardwicke & Bogue. One plant, however (*Lycium Europæum*), appears to me calculated to mislead; it is described (page 207) as "a rambling, prickly shrub, well known in this country as *Boxthorn* or *Tea-tree*, and often used for covering garden-seats, arbours, and the like, and is a hedge-plant in Palestine." At plate 9 is a figure of the plant, marked C, which is no doubt correct as it is found in Palestine, but bears no resemblance to the tea-plant so well known in England. Mr. Baker, curator of the Royal Herbarium at Kew, says, "it is *Lycium Barbarum* not *Europæum* that is commonly cultivated, but they are very near to one another, and the genus is in a great muddle and wants re-monographing." He says, "The *Lycium* of Syria is *L. vulgare* of Linnæus, *L. Mediterraneum* of Dunal, and copiously spiny when wild, but loses its thorns when under cultivation." The *Lycium Mediterraneum*, Dunal, D.C. Prod.; *Lycium Europæum*, Linnæus, Mant. 47; Desf. Atl-kock syn., is described in the "Flore de France," by Grenier et Godron, as with leaves a little fleshy, oblongues-obovées, insensibly attenuate in a short petiole, common on the whole littoral of the Mediterranean. No one looking at the figure at plate 9 could suppose it represented the tea-shrub, so

well known in England. The plant is stated in the "Treasury of Botany" as being known as "the Duke of Argyle's tea-tree," the leaves being recommended for use in the place of tea, a piece of advice not generally acted upon it would seem. The leaves appear in the figure so extremely diminutive that they never could have been used as a substitute for tea. There appears, therefore, to be some confusion; the plant in the figure should have been referred to as the *Lycium Europæum* of Palestine, but altogether unlike the tea-tree, sometimes found in a semi-wild state in England, where it is so well known as the tea-tree. Mr. Baker says he has not seen the Bible plant, and of course he can give no opinion as to the figure in plate 9.—*T.B.W., Brighton.*

Definite and Indefinite Inflorescence.—Sir J. E. Smith thought the distinction of not much importance, on account of the difference found among the species of *Allium* in the order of expansion of their flowers. Nor did Professor Lindley seem to recognize the distinction as of primary importance, for in this little work on Descriptive Botany, the spike, the raceme, and the corymb are represented by figures each terminated by a central flower. Such a central flower may indeed be found in the spike of Agrimony, the corymb of the Pear, the umbel of the Apple, and the panicle of London Pride. After noticing such facts, one may be pardoned for entertaining a doubt as to the existence of any form of inflorescence strictly indefinite, *i.e.*, incapable of producing a terminal flower on the axis of inflorescence, or a lateral bud below the flower upon its pedicle. Such a mode of inflorescence does, however, seem to be in the orders *Cruciferæ* and *Primulaceæ*, and it may be in other natural orders, only subject to such exceptions as belong to the province of teratology. For nearly twenty years I watched the inflorescence of cruciferous plants before finding an indisputable case of a flower-stalk with a flower on the summit and another below it on the side. This was on one of the ramifications of a much-branched stem of a perennial stock which flowered last year, and of which a note appeared in Science-Gossip of July, 1877. This year a similar phenomenon has appeared on another plant of the same kind. Foliar prolification of the inflorescence is, however, much more common, though I have observed it only in perennial plants, not in annuals or biennials. The stem of the watercress will sometimes grow beyond the series of flowers on its sides, producing leaves above the raceme as freely as below it. *Cardamine pratense* may be occasionally found with a tuft of leaves on the top of a flowering stem, and I have now in bloom in my garden a stem of a wallflower which bore flowers, produced pods, and ripened seeds last year. Between the two series of flowers came a tuft of leaves, and this year there is a branch above the mortal remains of last year's pods, which, as well as the main stem, has blooming flowers. If the stem be not exhausted too much to ripen seed, I will allow it to do so, that I may see if such a variation is hereditary. It thus appears that in cruciferous plants median prolification of the inflorescence is always foliar, median prolification of the flowers floral.—*John Gibbs.*

Orchis-hunting in Surrey.—Surrey is to me associated with many delightful rambles, and none of them more so than those I have denominated "Orchis-hunting." Living at that time close upon the North Downs, I was able to make acquaintance with some of the chalk-loving species of the Orchidaceæ seldom met with now, especially as I am at present located amongst the Red Sandstone of Devonshire. My "happy hunting-grounds" at that time consisted of the parish of Ockham as a centre, from which I made pedestrian excursions into the surrounding neighbourhood. Most of the species I find referred to in my notes were found within some five or six miles of what was then Ockham Middle-Class Schools. In the moist meadows around, and up what everybody knew as the "Rides," were found very plentifully, *O. mascula*, *O. maculata*, *O. latifolia*, *Neottia Nidus-avis*, and the *Listera ovata*. (The *Adder's Tongue Fern* was very plentiful in a meadow by the side of the Rides.) In a meadow near a pond called the "Sheepwash," I came upon the *Habenaria bifolia*, and on several occasions *O. morio*. It was, however, by walking some few miles and getting upon some of the chalk ridges that I made acquaintance with some of the more strange-looking species. In the adjoining parish of East Horsley was a hilly piece of ground known as the "Sheep Leas," as far as I can remember the name. I am not sure of the orthography of the word,—I give the name as it sounded to me. This was a favourite place for a holiday of the pic-nic order, and our people often resorted to it in days of yore. Many a pleasant day's botanizing I have done there. It was there I made acquaintance with the *Aceras anthropophora* and the *Ophrys mucifera*. The *Ophrys apifera* I found here most plentifully distributed, in fact, almost carpeting the ground. This odd-looking Orchis I also found in great abundance in a "rough field" near the Fox, on Ranmoor Common. I also remember a few being found in Ockham Park one season. As to the *O. mucifera* I think it was under the beech-trees on the Sheep Leas that I found it. In the same neighbourhood I found the *Ophrys aranifera*, and the *Orchis hircina*. I think it was in the Sheepwash meadow already mentioned that I also found the *Orchis conopsea*.—*J. Mills Higgins.*

Colias Edusa.—Can any of your readers of Science-Gossip give me a reason for calling the clouded yellow butterfly "Colias Edusa"? "Colias" meaning a kind of tunny-fish, and "Edusa" the goddess who presides over the nourishment of children.—*Haviland.*

GEOLOGY.

The Glacial Phenomena of the Long Island, or Outer Hebrides.—A paper on this subject has recently been read before the Geological Society by James Geikie, LL.D. The author gave a detailed account of the glacial phenomena of Harris and the other islands that form the southern portion of the Outer Hebrides. Evidence was adduced to show that Lewis has been glaciated from S.E. to N.W., and the shelly boulder-clays and interglacial shell-beds of that part of the Long Island were described in detail. Harris, North Uist, Benbecula, South Uist, Barra, and the other islands that go to form the chain of the Long Island were successively described under the headings of Physical Features, Geological Structure, Glaciation, Till or Boulder-clay, Erratics and perched blocks, Morainic débris and Moraines, Freshwater Lakes and Sea-lochs. Numerous bearings of striæ, which abound, were given, and these were held to prove that the whole Outer Hebrides have been glaciated by ice that flowed outwards from the mainland of Scotland. The position of abundant *roches moutonnées* points to the same conclusion, and this is still further supported by the "travel" of the Till. That deposit is generally absent or very sparingly present on the rock-faces that look towards the mainland, but it is heaped up in their rear, and spreads over the lower tracts that slope gently towards the Atlantic. On the west side of the islands not a few boulders occur in the Till, which have been derived from the east; and the same is true of certain erratics lying loose at the surface of the ground. The islands are well glaciated up to a height of 1,600 feet above the sea; and the line of demarcation between the glaciated and non-glaciated areas is extremely pronounced. Above 1,600 feet the hills show rugged, splintered, jagged, and sometimes serrated tops. The author regarded the Till or boulder-clay as the morainic material that gathered underneath the ice, and proof of this is given. Erratics and perched blocks are very numerous, and most of these, as well as much of the morainic *débris*, are believed to have been dropped where we now find them during the final melting of the ice-sheet. It was shown, however, that certain erratics and perched blocks and some well-marked moraines are due to local glaciers, as are also some of the striations in a few of the mountain valleys. The origin of the rock-basins, which are now lakes, was discussed, and attributed to the erosive action of ice. To the same cause were assigned the rock-basins which occur in certain of the sea-lochs. In concluding, the author pointed out that we may now arrive at a true estimate of the thickness attained by the ice-sheet in the north-west of Scotland. If a line be drawn from the upper limits of the glaciations in Ross-shire (3,000 feet) to a height of 1,600 feet in the Long Island, we have an incline of only 1 in 210 for the upper surface of the ice-sheet; and of course we are able to say what thickness the ice reached in the Minch. Between the mainland and the Outer Hebrides it was as much as 3,800 feet. No boulders derived from Skye or the mainland occur in the Till of the Outer Hebrides, and this was explained by the deflection of the lower portion of the ice-sheet against the steep wall of rock that faces the Minch. The underpart of the ice that flowed across the Minch would be deflected to right and left against the inner margin of the Long Island; and the deep rock-basins that exist all along that margin are believed to have been scooped out by the grinding action of the deflected ice. Towards the north of Lewis, where the land shelves off gently into the sea, the under strata of the ice-sheet were enabled to creep up and over the district of Ness, and thus gave rise to the lower shelly boulder-clay of that neighbourhood, which contains boulders derived from the mainland. The presence of the overlying interglacial shell-beds proves a subsequent melting of the ice-sheet, and a depression of the land for at least 200 feet. The overlying shelly boulder-clay shows that the ice-sheet returned and overflowed Lewis, scooping out the older drift-beds and commingling them with its bottom moraine. The absence of kames was commented upon, and shown to be inexplicable on the assumption that such deposits are of marine origin; whilst if they be of torrential origin their absence is only what might be expected from the physical features of the islands. The only traces of post-glacial submergence are met with at merely a few feet above present high-water mark.

The Fossil Fungus.—Too much credit cannot be given to Mr. Butterworth for his labours on fossil plants, carried on for so many years under great difficulties but with great perseverance, and with most important results. Prof. Williamson has again and again expressed his obligations to Mr. Butterworth; and the collections of the British Museum have several valuable specimens prepared by Mr. Butterworth's own hands, the importance of which I have testified to on several occasions. No doubt Mr. Butterworth observed the fossil fungus in his specimens before they were sent to London, although Mr. Smith and myself were ignorant of it. But the fungus had already been observed by myself, and shortly described from specimens in the British Museum prepared by Mr. Norman, and the interest of Mr. Butterworth's specimens to me, when they were shown me by Mr. Young, was that they confirmed the specimens I already possessed, and added to my knowledge of the fungus. The two *Palæozoic* fungi which Mr. Butterworth refers to could not include the *Neozoic* parasite in the fern-stem from Herne Bay, as he supposes. These two Palæozoic fungi were—1. The curious mycelium masses found at Newcastle by Mr. Atthey, and described and figured in his "Annals and Magazine of Natural History"; and 2. The

parasite fungus in the stem of a Lepidodendron described by myself without a name, and afterwards, by the help of Mr. Butterworth's specimens, described at greater length by Mr. Smith.—*William Carruthers.*

THE TERTIARY FLORA OF AMERICA.—Thanks to Dr. Hayden, we have received the seventh volume of the Report of the United States Geological Survey, containing Prof. Lesquereux's "Contributions to the Fossil Flora of the Western Territories," Part II. "The Tertiary Flora." It is a large and handsome quarto volume of nearly 400 pages, and contains 65 magnificently-lithographed plates. In everything, type, lithography, quality of paper, and even binding, these publications shoot far ahead of our own "Memoirs of the Geological Survey," whose small type seems intended to deter people from reading them—a plan which is considerably aided by the extravagantly high prices charged for them! Our geologists are not particularly fortunate in the possession of large salaries, and the high price charged for their memoirs almost places them beyond the reach of ordinary readers, and thus condemns the labours of some of our ablest scientific men to an undeserved obscurity. Moreover, the niggardly way in which the publications of our own survey are doled out to the authors, and the plan adopted of sending none out for review, must be a mode of treatment keenly felt by the authors, who at least ought to be publicly credited with the scientific value that would be attached by all geologists to their work. In this respect the United States Government is the very opposite of our own. Their splendidly got-up volumes are sent over to the scientific journals of Europe without stint, and so the American States geologists obtain a recognition which the unaccountable stinginess of the British Government denies to ours. Prof. Lesquereux's volume is the best we have seen of the series, and it will surely take its place as a most valuable contribution to Fossil Botany.

ANCIENT VEGETATION.—The notice on this subject in last month's "GOSSIP" on American Silurian plants is not quite correct, as plants have been known long since in the "Glengariff" or "Dingle beds" of Ireland. These rocks were taken by Jukes out of the Silurians, and put provisionally in the "Old Red Sandstone," on account of the plants found in them. The "Dingle beds," however, pass downward into typical Silurians, while they are capped unconformably by the "Old Red Sandstone."—*G. H. K.*

NOTES AND QUERIES.

STARLINGS AND SPARROWS' EGGS. — Having occasion to enter the roof of our house, I came across the nest of a house-sparrow, and on looking into it found that it contained three young ones just hatched, one egg that was rotten, and to my great surprise a starling's egg. This making me rather curious, I prolonged my search, and about three yards from the nest occupied by the sparrows I discovered a starling's nest containing five or six fully-fledged young ones. I must not forget to state that the starling's egg found in the sparrow's nest had apparently only been sat upon but a few days. Will any of your readers kindly state if such an occurrence is rare?—*C. H. Sharp.*

THE GREY "LAG."—Can any one give the meaning of the word "Lag," as applied to the goose? The proper grey wild-goose, as recognized by naturalists, is popularly called the "grey lag," and the universal summons to a flock of geese, in part of Gloucestershire, is—"Come lag, Come lag, Come lag." Now, whence "Lag"?—*G. L.*

VISITS OF THE CUCKOO.—Does the Cuckoo, like the Swallow, revisit the same place yearly? I feel interested to know, for this reason. Last year I noticed many times one of the same colour as the Kestrel, quite red; unfortunately I was not able to secure it for my collection of birds. This year again I have also seen the same bird or one very much like it, and from this circumstance I am inclined to think that the bird does return to the same place; but whether I am right or not I cannot say. At the same time, will you be good enough to describe for me the Cuckoo's egg. I have the Rev. F. O. Morris's "British Birds," but the Cuckoo's egg is not described there, I mean the colour of it. I procured a little while back a very peculiar skylark, of a fine cinnamon colour. I have it stuffed in my collection.—*Wm. Bennett.*

THE SWIFT'S APPEARANCE.—The fact of the Swift appearing on May 1st is not a very unusual occurrence. I live to the north of your correspondent, I should therefore see it a little later; yet I find, on referring to my notes, that I saw numbers on April 30. Stragglers put in an appearance about the 28th, which is about the average date for this city.—*J. B. P., Hereford.*

VARIETIES OF CAMBERWELL BEAUTY.—In reply to Mr. Morse's inquiry, I can most certainly say that he is misinformed. I have seen numbers of specimens of European *V. Antiopa*, and several British ones; there is a distinct difference in the shade of the border: in the former it is pale yellow, in the latter a pearly white or pale cream-colour. American examples vary again; the ground is the same or a little deeper, but more dappled with black specks than the European specimens; they are also much larger. I have one that measures rather more that $3\frac{3}{8}$ inches.—*J. B. P.*

HOW TO DESTROY ANTS.—In reply to Mr. George Pearce's question, as regards the most successful mode of destroying ants, he will find Keating's insect powder good, as it will at once kill them, and if scattered about the rooms and furniture infested by them, will effectually drive the ants away.—*E. Edwards.*

COLOURS OF DRIED PRIMROSES.—Can any of your readers kindly inform me how it is that the beautiful colour of the *Primula vulgaris* and *elatior* should, when destroyed, change to a bright green, leaving only the centre of the corolla (and that a small portion), together with the stamens, the original primrose-colour? The leaves turn brown. Is there any method of preserving this lovely flower, so as to retain the primrose colour of the petals?—*E. Edwards.*

DITTANY.—There is a foreign species of Marjorum called "the Dittany of Crete," much used in medicine, and known as *Origanum Dictamnus*, genus *Labiatæ*, and the "Bastard Dittany," *Dictamnus Fraxinella*, one of a small order of *Rutaceæ* found in Southern Europe and Asia Minor, and also the *Cunila mariana*, called Dittany, likewise belonging to the genus of *Labiatæ*. This is all I am able to find in my botanical books concerning Dittany, and I have much pleasure in forwarding it.—*Helen Watney*.

MANDRAKE.—Mandragora is the name applied to a genus of *Solanaceæ* or *Atropaceæ*, natives of Southern Europe and the East. Mandrakes have poisonous properties, and are somewhat like in their effects to belladonna. The roots of the Bryony are often trained round a mould, and then sold as Mandrakes. Linnæus considered the red-berried Bryony a variety of the *Bryonia alba*, or White Bryony, which is a Central European species possessing like properties to the English species. —*Helen Watney*.

ROBINS' EGGS.—I found myself some years ago a robin's nest, containing five *white* eggs, of a larger size than any eggs of a robin that I have ever seen, more the size of a cuckoo's egg. The other day I was asked to name an egg, which from the nest I had no hesitation in setting down as a robin's, too; this nest also had contained five eggs. As both these nests contained the full complement of eggs, all of the same size and colour, they must have been an abnormal production from the birds. If there had been a single egg, I should have concluded it to be a white cuckoo's. Is this an unusual variety? I have, you see, come across two such instances myself; others may have done the same.—*C. A. Haden*.

THE HOUSE-MARTIN AND HOUSE-SPARROW.—At the commencement of the past week two martins began to build under the eaves of my house. Being a great admirer of them I was pleased, and hoped nothing would hinder the completion of the nest. It was not long, however, before I noticed two sparrows taking more interest than I liked, and after five or six days, when the nest wanted but little to finish it, they drove away the rightful owners, and took possession. I could not remain neutral; so with small pebbles I tried at intervals for two hours to drive away the sparrows. This proved effective only for the moment; so I thought of another expedient. Taking my trout-rod, I tied a piece of string to the end and placed it within a foot of the nest. I never saw more of the sparrows, but in less than an hour the martins recognized the altered state of things, and soon completed the nest.—*H. G., Horbling Lodge.*

BIRDS SINGING AT MIDNIGHT. — In SCIENCE-GOSSIP for April 1 of this year there is an account of "Birds Singing at Midnight," by Mr. R. Standen, Goosnargh, Lancashire, in which he states that he heard the various songsters on the night of Saturday, 15th February. As I am rather anxious to fix the exact date of the occurrence, I should be greatly obliged by your informing me whether Friday, the 15th February, or Saturday, the 16th, is meant; either the day or date being evidently a misprint.— *X.*

POSITION OF THE PASQUE FLOWER.—Mr. Barrett asks in the June number of SCIENCE-GOSSIP whether the finding of *Anemone pulsatilla* at a certain elevation "is a universal fact, or only a partial one"? From my own experience I should say the latter. I have found it in both situations; but if I remember rightly, in greater abundance in some of the chalk ridges of the North Downs than in the lower-lying country around. I have found it growing in the corner of a hay meadow, the land being quite flat, in the parish of Ockham, Surrey, in close proximity to some woodlands. I have also found it growing some two or three miles off, in the adjoining parish of East Horsley, on a piece of rising ground, or hilly pasture, and called the "Sheep Leas."—*J. Mills Higgins.*

SOLANUM DULCAMARA. — In reference to the notes lately given about this plant, I forward the following facts. In 1869 one of my pupils partook rather freely of the berries while he was searching one evening for "haws." On reaching home he became sick, and for several hours he was in a wild and violent delirium, requiring to be forcibly held down. This happened, too, after the stomach had been emptied of its contents, the poison having had time to extend itself into the system. The physician who attended him at his house told me that the pupils of the eyes were much dilated, and the symptoms closely resembled those resulting from taking the berries of *Atropa Belladonna*; in fact, he concluded that these were the berries the boy had eaten. Ice in large quantities was applied to the head, and the patient soon recovered. I copy this from notes which I made at the time. It could not be ascertained how many berries had been eaten.—*Henry Ulyett, Folkestone.*

QUERIES AS TO FLOWERS.—To what flowers do the following lines allude?

> "One blossom, 'mid its leafy shade,
> The virgin's purity portrayed;
> And one, with cup all crimson dyed,
> Spoke of a Saviour crucified."
> *Holy Flowers*, M. HOWITT.

> "So have I seen some tender flower,
> Priz'd above all the vernal bower,
> Shelter'd beneath the coolest shade,
> Embosom'd in the greenest glade,
> So frail a gem, it scarce may bear
> The playful touch of evening air;
> When hardier grown, we love it less,
> And trust it from our sight, not needing our caress."
> KEBLE.

C. F. W.

HOP-GARDENS.—I am living in the midst of hop-gardens. Can any of your readers kindly tell me if there are any curiosities of vegetable or insect life to be gathered during the season?—*A. C. Smith, Crowboro'.*

LOB-WORMS.—In reference to this subject by Professor Paley, in SCIENCE-GOSSIP for last month, permit me to say that the materials found at the entrance of their holes had adhered accidentally to their slime, and were rubbed off on entering. Leaves with stalks forward they do not carry, with the thin end forward they do, and frequently pass into the hole. Lob-worms clear away the things they have brought home, because it is not convenient for them to adhere again when they go out on visits of ceremony. In clean-swept lawns these encumbrances are not met with, and the entrance to the holes is not obstructed. Grass and leaves may be eaten by these worms, but I do not think they are taken to the hole, and then left at the entrance for breakfast. Fifty years ago and more I used to handle these creatures as Isaac Walton did—tenderly.—*H. P. M.*

BLACKBIRDS' NEST.—A pair of blackbirds have built a nest just six feet from the ground in a honeysuckle climbing up a verandah outside our drawing-room window, and close to a door which is in constant use for going in and out of the garden. They have now hatched their young ones in spite of all the disturbance arising from curious eyes watching them,

and from three little terriers constantly playing and barking immediately under the nest.—*M. T. Palmer.*

BATRACHOSPERMUM, &c.— I cannot say whether I shall be giving any or new interesting information when I inform your readers that recently the Misses Willis brought some fine examples of the lovely fresh-water alga, *Batrachospermum moniliforme* from the stream at Ewell. And that Mr. Morse, of the original Epsom nurseries, discovered in the same parish, a habitat for *Cystopteris fragilis.—John E. Daniels, Epsom.*

MALFORMATION IN A SHEEP.—I saw lately in London a handsome well-grown wether sheep two years old, with five legs, the extra one being apparently anchylozed to the right scapula. The shank-bone was full-sized, but instead of one set of the other feet bones there were two, the four hoofs being prolonged into claws. I have often met with monstrosities, but not often so full-grown.—*A. Bell.*

DOUBLE LILAC.—In a garden at Southend I have observed a lilac-tree covered with double flowers. The owner told me that five or six years ago this peculiarity was first remarked on one or two branches only. The quantity gradually increased, and now the whole tree is nearly covered with double blossoms. There are other lilac-trees in the garden which have never shown any disposition to become double. Is this an uncommon circumstance? I have never met with it before.—*E. Fisher.*

SUPERSTITIOUS DISLIKE TO THE WREN. — In February's SCIENCE-GOSSIP, Mr. H. Allingham, in an interesting note, speaks of the bitter dislike which the country folk in some districts entertain to the Wren. I have occasionally met with instances of this superstition myself, but have always been unable to trace the reason for such an aversion. Mr. Allingham says the Wren has been designated the "devil's bird." Has he heard the old couplet which says—

> "The robin and the wren
> Are God's cock and hen?"

Apropos of this bird, I may mention that on Saturday, the 12th January, a newly-built wren's nest, containing five eggs, was discovered at Galley Hill, near Gravesend.—*G. O. Howell, Shooter's Hill.*

DOUBLE-BLOSSOMED HORSE-CHESTNUT.—In the New London-road, Chelmsford, during May, a horse-chestnut tree in the garden belonging to Weston Villa was in full bloom. The flowers were apparently all the subjects of multiplication, for in a panicle, which I took the liberty to pluck, I found twenty-four petals, and twenty stamens in one flower, and from the general appearance of the flowers on the tree they seemed more or less like it. The tree is well-grown and vigorous, equalling in height the villa near which it stands; but is by no means old, so that it may be a study for botanists during many years to come.—*John Gibbs.*

RANUNCULUS REPENS.—In Cheshire the curious or strange name of Devil's-claw is applied to this species, but in "Flora Vectensis" it is stated the term is used to an allied species, the *R. arvensis.*

THE NATTERJACK TOAD (p. 142).—This reptile emits a rather strong sulphurous scent when frightened; but only extremely fastidious persons could consider it "a most intolerable odour." The locality nearest to London in which I have found the animal is Barnes Common, where it was very abundant seven or eight years ago. It is also to be found on Coombe Warren, between Wimbledon Common and Kingston.—*W. R. Tate, Blandford, Dorset.*

CHEAP AQUARIA.—For the benefit of "W. D. B.," who asks for a way of constructing a cheap aquarium, I will describe the primitive one I have in use. It is simply a "carboy," such as can be procured at any chemical works for a small amount of money. To convert it into an aquarium lay a ring about ten inches in diameter on top of it for a guide, and run a glazier's diamond around, then use a hot wire, and you have a clean cut edge, which you can set off a little by binding with tinfoil or something of a similar nature. I don't know the exact capacity of mine, but believe it approximates something near fifteen gallons. For keeping in stock objects for the microscope, such as entomostraca, infusoria, &c., I prefer a small globe holding not more than two or three pints.—*H. F. Atwood, Chicago, U.S.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS. — As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

V. G.—The insect, of which you sent us a sketch, is *Libellula depressa.*

E. E. EVANS (Brimscombe).—Hewitson, in his "Eggs of British Birds," gives *no* markings on the eggs of the Martin (*Hirundo urbica*). They are nearly white, with a slight plum-coloured tint at the smaller end.

T. SPENCER SMITHSON.—Your letter inquiring the name of a diatom did not contain any specimens when it reached us.

R. J. S.—The plants are not "Rushes," but "Cotton-sedges" or "Cotton-grasses" (*Eriophorum polystachyum*) common in all marshes. Its economical employment has been frequently attempted, but hitherto, we believe, without success.

W. C. PENNY (Frome).—The figure of *Nymphon gracile,* in the last number of SCIENCE-GOSSIP, is ten times the size of the animal. You will find an account of it in Taylor's "Half-Hours at the Sea-side," from which the above-mentioned illustration was taken.

WARRAWARRA (St. Vincents, W.I.). — The specimen enclosed was a species of Mistletoe (*Viscum*). Could you send a larger specimen?

C. T. M. (Plymouth).—The ferns were respectively *Adiantum trapeziforme* and *Pteris tremula.*

S. K. A. (Stafford).—Your specimens are—No. 1. Weasel-snout (*Galeobdolon luteum*, L.). No. 2. Wood Sanicle (*Sanicula europæa*).

C. S. (Sevenoaks).—Many thanks for the specimens of orchids.

R. R. (Earlstown, N.B.).—The fern No. 1, is very rare (*Asplenium lanceolatum*). No. 2, the Common Male-fern (*Lastrea Filix-mas*). No. 3, *Lastrea dilatata.*

G. CLINCH.—Many thanks for your excellently-mounted specimen of fossil wood.

L. L.—Get the "Collector's Handy-book of Algæ, Diatoms, Desmids, Fungi, Lichens, and Mosses," translated and edited by the Rev. W. W. Spicer, and published by Messrs. Hardwicke & Bogue, 192, Piccadilly, at 2s. 6d.

PROF. TEMPERE.—The plant you enclosed was *Brassica monensis.* It is confined in its distribution to the western and south-eastern coasts.

E. W. ANDREWS.—Your specimen is *Ranunculus divergens,* Schulz, though a much smaller one than we have seen before.

G. S. MITCHELL.—Yes; the place of birth does not affect the children.

R. BOLTON.—The following are well known elementary books on geology:—Taylor's "Geological Stories"; "Geology," by J. Clifton Ward, F.G.S.; Jukes' "Geology," new edition, by Jukes-Brown; Skertchley's "Geology," and Tate's "Geology," published by Lockwood & Co.

N. O. (Brompton).—Your insects are—No. 1, *R. cratægata;* 2, *V. ruberata;* 3, *M. hastata;* 4, *T. batis;* and 5, *N. camelina.*

EXCHANGES.

Aceras anthropophora, Gagea lutea, Silene conica, Scirpus pungens, &c., for *Orchis incarnata, Scirpus triqueter, Pyrus communis, Potentilla rupestris, Carex tomentosa, Lychnis alpina, &c.*—G. C. Druce, Northampton.

Having about two dozen duplicates, well mounted, I shall be glad to exchange them. For list, &c., write to F. M. Swallow, Charing Cross Hospital, London.

Wanted, good gathering of *Pleurosigma angulatum*, for Diatoms, slides, material, or cash.—Eug. Mauler, Travers, Switzerland.

Diatoms.—Material from Santa Monica, containing, among other good forms, *Aulacodiscus pulcher*, *Actinoptychus Grün-dlii*, &c. &c. Also material from islands of Fur, Trinacria, &c., very fine. Guanos and recent material required. Send list.—W. M. Paterson, Westfield-terrace, Loftus.

Can offer sets of many rare and valuable British Eggs, side-blown, for others equally rare and valuable.—All letters answered.—T. W. Dealy, 140, Clarence-street, Sheffield.

Fossils from the Red Crag, to exchange for those of the Barton Series, or from the Gault.—Rev. H. B. Capel, Great Easton Rectory, Dunmow, Essex.

"Cultivated Vegetables," by Philips, handsomely bound in calf, 2 vols., 1822, ten inches by six. Also "Pomarium Brittanicum," by same author, in 1 vol., same binding, &c., in exchange for back vols. of Science-Gossip, *Monthly Entomologist*, or Ray Society's publications; value 20s.—G. N. Minnitt, 5, Regent-street, Nottingham.

Nitella translucens, showing circulation, in exchange for well-mounted Slide.—J. B., 36, Windsor-terrace, Glasgow.

Send well-mounted Slide in exchange for an Anatomical specimen (mounted).—E. Atkins, 200, Essex-road, Islington, London.

Wanted (about one dozen each) Fresh Specimens of 513 and 875 (7th edition); also Ecbolium. Exchange rare plants, &c.—Higginson, Newferry, Birkenhead.

A few well-mounted Slides to exchange. Lists to Tho. Shipton, Chesterfield.

An Album of eighty Micro-photographs of nearly 200 of the Diatomaceæ, magnified 250 to 4000 diameters, in exchange for first-class ¼-inch Objective, or first-class Micro Slides (approval).—Address, Dr. Redmayne, Bolton, Lancashire.

Wanted, foreign Land and Fresh-water or Marine Shells, also British Birds' Eggs, in exchange for British Land and Fresh-water Shells, and foreign Land and Marine. Duplicates of about 100 varieties of each.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

Well-mounted Physiological specimens in exchange for unmounted material of interest.—George Baker, 37, Cross-street, N.

For *Æcidium tussilaginis* send stamped directed envelope, and object of interest, to Charles F. W. T. Williams, Kingmeade, Woolcott Park, Redland, Bristol.

Orchis Simia, Lam., for either 37, 106, 459, 511, 546, 949, 955, 1222, 1223, 1279, 1286, 1329, 1410, 1669, or 1678, 7th edition Lon. Cat.—A. B., 107, High-street, Croydon.

Parasite of Crow, or other insect preparations, mounted in balsam, in exchange for Eggs of insects, Diatoms or soundings, mounted opaque.—J. Horn, 5, Belle-vue-square, Scarboro'.

For unmounted Hair of Vampire Bat and Seal, send stamped envelope and object of interest.—E. J. Wilson, 14, Albion-road, Dalston, E.

I should be glad to exchange Lepidoptera with collectors on the Continent or elsewhere.—Roland Green, Rainham, Kent.

C. edusa, *M. cinxia*, *V. polychloros*, *L. adonis*, *L. corydon*, *A. ulmata*, and others, offered for Lepidoptera in any stage.—W. Jordan, Cockfield, Sudbury, Suffolk.

Sea Birds' Eggs (such as Guillemots, Razorbills, Kittawakes, Puffins), to exchange for other Eggs, side-blown, or Butterflies.—Geo. W. Coultas, High-street, Bridlington, Yorks.

Polariscope Object.—On receipt of stamped and addressed envelope, will be happy to forward a small portion of "Arragonite" from coal-measures. Described in Science-Gossip, 1877, page 192, in reply to J. J. M.—Address, J. J. Morgan, 5, Prospect-place, Tredegar.

Beautiful opaque object (mounted), *Orbulina*, from Bermuda, for other good Foraminifera or Diatoms.—J. Ford, Wood View, Newbridge Crescent, Wolverhampton.

Nos. 171, 625, 1071, for 477, 500, 517. Lists exchanged. A very extensive list of duplicates can be supplied by C. A. O., 76, Trafalgar-road, Old Kent-road.

Plants of *Asarum europæum*, or *Asarabacca*, in exchange for rare British Ferns or flowering plants.—James W. Lloyd, Kington, Herefordshire.

Well-mounted Slide of part of Caterpillar, showing spiracles, &c., offered for good clean material, unmounted.—J. Neville, Wellington-road, Handsworth, Staffordshire.

I have fine specimens (collected last month) of *Fritillaria meleagris*, which I should be glad to exchange for an example of *Utricularia vulgaris*, if collected this season, or *Hierochloe borealis*.—G. Garrett, Harland House, Tyler-street, Ipswich.

Hæmatopinus spinulosus from rat, and *H. vituli* from calf, offered for other animal parasites. Send list to H. E. Freeman, 1, Templeton-road, Finsbury-park, N.

Scientific Books and Microscopic Slides, offered for Marine Animals in spirits, especially *Cephalopods* and *Echinoderms*.—Wm. Cash, 38, Elmfield-terrace, Halifax.

Side-blown Eggs, 300 varieties, including Golden and other Eagles, Ospreys, Falcons, Owls, Greenshanks, Buzzards, Cupbills, Stints, Chough, Bartram's Sandpipers, Cranes, Storks, Aquatic Warblers, Bohemian Waxwings, Pine Grosbeaks, Great-spotted and Yellow-billed Cuckoos, Belted Kingfishers, Bustards, Buff-backed and great White Herons, Green Sandpipers, little and glaucous and other Gulls, and many other varieties. Write for list. Exchange wanted.—J. W. Sissons, 11, Priory-road, Sheffield.

Pathological Specimens wanted, either hardened or recent. Choice Slides of very superior finish, or select unmounted materials (of which lists will be forwarded) are offered in exchange.—Dr. Marsh, Duke-street, St. Helen's.

Wanted, one or two good specimens of *Calymene Blumenbachii*. I will give a good exchange in Cambridge Greensand fossils.—J. W. Carr, Union-terrace, Cambridge.

Several thousand specimens of British Shells, Fossils, Minerals, Slabs of Polished Coral, Madrepores, also specimens from Deep-Sea Dredgings, for Foreign Shells, Fossils from the Gault (if good specimens), and all other kinds of Fossils, particularly Trilobites, or Fossil Crustacea of any kind.—A. J. R. Sclater, 4, Bank-street, Teignmouth.

Wanted, *Avicula Tarentina*, *Anomia striata*, *A. patelliformis*, *Arca tetragona*, *Pandora rostrata*, *P. obtusa*, *Thracia convexa*, *Thracia pubescens*, *Psammobia vespertina*, *P. costulata*, *P. tellinella*, *Venus casina*, *V. verrucosa*, *V. fasciata*, *Astarte elliptica*, *A. sulcata*, *A. crebricostata*, *Pecton Audouinii*, *Pecten danicus*, *P. tigrinus*, *P. similis*, *P. striatus*, *P. furtivus*, for British Shells, if in stock.—A. J. R. Sclater, 4, Bank-street, Teignmouth.

"The Zoologist," 2nd Series, complete, in parts, January, 1866, to December, 1876, and vol. i. of the 3rd Series, 1877, 12 volumes; also Gmelin's (S. G.) *Historia Fucorum*, 33 plates, 4to., old calf, 1768; also a Mahogany Box (16″ × 8″) containing specimens exemplary of the manufacture of Alum, from its raw state up to the perfect crystal (a large crystal of Alum, 14 inches long), for works on Fungi, &c. Greville's *Cryptogamic Flora*, or Sowerby's *Fungi* wanted.—C. Perceval, Hanbury, Bristol.

For specimen of *Anemone pulsatilla*, send address to John W. Carr, Union-terrace, Cambridge.

For parasites from Horse or Mole, send well-mounted Slide to George Turvill, East Worldham, Alton, Hants.

Birds' Eggs, side-blown, labelled; well marked and selected specimens; all ready for placing in cabinet; 300 varieties. Exchange arranged by letter. Send at once for full list, post-free, Henry Sissons, Westbourne-road, Sheffield.

A naturalist, who is going on a dredging cruise round the South and West coast of England, would be glad to hear from a gentleman having similar tastes who would be willing to join him and pay a small part of the expense. For further particulars address C. P. Ogilvie, F.L.S., Sizewell House, Leiston, Suffolk.

BOOKS, &c., RECEIVED.

"Contributions to the Fossil Flora of the Western Territories." Part II. The Tertiary Flora. By Prof. Lesquereux. Washington: Government Printing Office. 1878.

"The Insect Fauna of the Recent and Tertiary Periods." By H. Goss, F.L.S., F.G.S.

"Industrial Art." June.
"Midland Naturalist." ,,
"Land and Water." ,,
"Chambers' Journal." ,,
"American Naturalist." ,,
"Botanische Zeitung." May.
"Der Zoologische Garten." No. 4.
"Comptes Rendus." No. 20.
"Feuille des Jeunes Naturalistes." June.
"Journal de Micrographie." May.
"Boston Journal of Chemistry."
"Ben. Brierley's Journal."
&c. &c. &c.

Communications received up to June 8th, from:—J. M. M.—S. G. P.—A. B.—L. L.—R. W.—A. A.—J. B.—W. H. P.—E. W. A.—J. T.—J. F. R.—G. H. K.—W. H. P.—W. B.—W. H. S.—A. C. S.—G. N.—E. de B. M.—F. M. S.—S. W.—W. E. R.—T. B. W.—Col. G. E. B.—J. M. W.—J. M. H.—G. N. M.—W. P.—H. G.—H. U.—G. P.—J. E. D.—E. M.—T. W. D.—C. S.—W. W.—M. J. P.—J. C.—H. B. C.—A. R.—A. B.—W. C.—J. W. C.—V. G.—E. E.—G. C. D.—J. H. M.—H. E. W.—H. S.—J. K. A.—W. C. P.—C. A. S.—E. L.—W. F. A.—A. M. McA.—Prof. G.—Q. C.—Prof. B.—R. J. S.—J. P. G.—G. S.—G. M. D.—J. B. P.—J. W. L.—Dr. R. B.—J. F.—B. M. O. L.—J. J. M.—M. M. B.—J. W. N.—H. E. F.—H. P. M.—E. S.—G. W. C.—J. H.—M. V.—W. J.—W. R. T.—W. C. P.—G. C.—E. E. E.—R. G.—E. J. W.—J. H.—A. B.—F. W. E. S.—J. B.—C. F. W. T. W.—J. M. C.—J. W. S.—Dr. M.—J. W. B.—H. N. B.—G. G.—W. D.—G. B.—W. S.—W. A. H.—C. F. W.—J. T. G.—C. W. B.—E. E.—I. C.—E. D. B.—T. S. S.—F. M.—T. S.—H. H.—Dr. R.—J. T. G.—C. S. P. P.—&c. &c. &c.

ANOTHER WAY OF MAKING PLASTER CASTS OF FISHES, &c.

By J. H. LAMPREY, Editor of "Industrial Art."

HAVING made many hundreds of casts of sea and fresh-water fishes, and having tested every method I have seen employed, I have come to the conclusion that the simplest and most effectual plan is the following :—Place the fish on a board, pin out its fins and tail neatly with ordinary pins, pass some brown paper or tow inside the mouth, in order to raise the eye if sunken from any cause, or to force asunder the lines of the mouth and operculum, which become contracted after death; place some putty under the dorsal fin, and then trim away all that extends beyond its outline. The fish is now ready to mould from. Next, take a long strip of thin sheet zinc, about two or three inches deep, and place it in the form of a wall all round the fish, and about one inch from it, at every point; partly split asunder a fire-wood stick, and with it clip the free ends of the zinc wall, drive in a twelvepenny nail at each end to keep this wall steady. Bear in mind that both the pin points and the nails need only sticking in the wood in the most temporary way. Now take some plaster of Paris in a cup, and, after mixing it as thin as cream, smear the inside of the zinc along its edge where it comes in contact with the board, and pour some down the place of junction near the clip. In a few minutes this extemporized dish is water-tight; now nearly fill it with the cleanest water procurable, and sprinkle rapidly from a ladle some common or second-rate plaster of Paris, coloured with a little washing-blue, over the fish until it is just covered with plaster; now lay four pieces of strong cord across the fish, leaving the ends over the sides of the zinc receptacle; having arranged these cords so that they just touch the plaster, without any loss of time continue to pour in the dry plaster until the vessel is full, or there is at least one inch of plaster over the highest part of the fish, then remove the cords by lifting each end at once; as soon as the plaster is *set*, break away the zinc band, and strike the board sharply with a hammer until the plaster becomes detached; if it sticks closely, pour a pail of water over the plaster, and it will at once give way. Turning over the mould we have the fish buried in the case, or mould of plaster, with only a very small portion of the underside of the fish exposed where it rested on the board. Proceed to break away the thin coat of plaster which has settled along the margin until only an inch of plaster, or even less, remains from the fish outline; remove the putty from the under portion of the back fin, pull out the padding from the mouth, and then lift up the tail, draw the thin end of the fish slightly backwards and upwards; be careful not to injure the surface, but get out the jaws and raise out the back. Use no force that would break the fine surface of the mould. If need be, open the fish, and remove the intestines, and so give more space for getting out the fish; this being successfully accomplished, dip the whole mould in water, and then pour in a spoonful of naphtha, which will cover the cast with its oily adhesion; wash it again with water, and place the mould in a vessel of water; pour in the plaster so that it will fill the interior of the mould, but have ready some copper bell-wire bent to fit the tail, back fin, and pectoral fin, if raised at all. No care need be bestowed upon the *shapes* of these wire supports so long as they are flat and just roughly define the form of the tail and back fin; the plaster must be poured over the mould in sufficient quantity to represent the board on which the fish was resting. By casting under water there are no air-bubbles, and the plaster is homogeneous. After a few hours, which may be profitably spent in cleaning up the work-table of all the filthy plaster, the plaster-mould must be plunged into cold water, and the table on which it rests must be struck with a mallet. To cause the mould to separate from the cast, take a chisel, and where the line is defined by the

plaster of the mould tinted with washing-blue and the perfectly white plaster of a better description used in the casting, insert the edge of a broad chisel, and tap it gently with the mallet; make several very cautious attempts along the edge of the two plasters, until there is an evident sign of a parting having taken place; now plunge the whole under water, or pour some over the edge, and the shrinkage will give the desired cleavage. If, in endeavouring to break open the plaster, a portion of the cast is knocked away, it can be replaced, the cords drawn up through the half set plaster have served to cut it up, but if the fish is round, and the plaster has much "under-cutting," it will require much skill to break away the mould without injury to the cast beneath. It will be well, therefore, to commence operations with a flat fish, whose head, mouth, and eyes are the only highly developed portions; the fins can be pinned out, after the skin has been washed with great care, to remove all the slime with which most fish are covered. The body of the mould taken from a flat fish of course will come away like a seal, the impression beneath being devoid of undercutting, but the head of the fish cast requires great care, as about it are portions of great delicacy of structure which may break away, Casts of fishes in plaster are only of value to the student; they are heavy, and liable to injury; to be worth having, fish-casts should be *made in paper*. From the plaster moulds we have described these paper casts are made by successive layers of clean white paper, and paste made from rice flour, backed by coarse paper, chips, and thick wood shavings, interspersed in the work, or a bit of common wire netting cut to fit the mould, if the fish to be represented is large in size, as a salmon or pollack. The first layers of white paper need being spread with extreme care, and if edges do occur in these first layers, the paper must be torn and not cut, as the joining cannot otherwise be concealed. The plaster cast cannot be painted, all the attempts to make plaster and colour agree having hitherto failed, and where gilding is resorted to, the sharpness of the cast is utterly ruined. The paper cast can be painted in fine washes of water-colour, or gold and silver. The varnish over water-colour does not injure the sharpness of the mould, and it is possible so to imitate a fish, in this way, that the very keenest angler may be deceived as to the material. There are some fishes which can be cast showing both sides, as a gurnard, or a cat-fish. Suspended by a fine line, these casts are capable of accurately representing the originals, but there is one difficulty about plaster casting,—it is, without exception, the dirtiest occupation upon which an amateur can engage himself. The plaster (if not properly dealt with) will follow the operator over the house, adhering to his boots and clothes, and hands, to the great discontent of servants and others, who object to the filthy traces which are so difficult to remove from floors and carpets.

IS THE BLACKNESS ON ST. PAUL'S MERELY THE EFFECT OF SMOKE?

By Professor Paley, M.A.

Many years ago I took a great deal of pains to investigate a question which to many, perhaps, will appear both trifling and useless, but which really has an important bearing on the aspect of our great public buildings. It is often said, that Paris is not such a smoky city as London, because the stone buildings are much whiter. The north side of St. Paul's Cathedral must, from its extreme blackness (curiously relieved as it is by lines and patches of light), have attracted the attention and excited the regret of most observers. There are other buildings, of course, *built with the same kind of stone*, which are equally black; there are even towns, such as Bath, built entirely of a similar (oolite) stone, where all the new houses are of a rich creamy colour, but most of those built a hundred years ago are as black as a piece of black cloth.

From investigations I made, and which I think worth being recorded, in order that further inquiries may be conducted with patient and scientific care, I was led to believe that this blackness is due to a hitherto unknown and undescribed species of lichen.

Two of its peculiarities are, that it only grows upon some kinds of limestone, and it will not grow where the rays of the sun fall directly upon the surface.

I first noticed the latter fact in a wall of rusticated Italian work at Cambridge. It faced due west, and it overlooked the country for many miles, so that smoke was not likely to have caused the blackness. The whole wall in this part reminded me somewhat of the lights and shades of a photograph. Those surfaces were quite black on which the sun could not fall, and those remained quite white on which the rays were directly incident. I concluded that, at least, sun-light was in some way concerned in the appearance produced. But what reason can possibly be alleged why a stone should contract less soot in the light than in the dark?

I proceeded to scrape off some of the black surface, which I collected, in the form of black dust, exactly like gunpowder. If, I argued, the blackness is really soot, surely a washing in hot water with soap or soda will bring me white lime-dust, or lime-sediment. But no! I might as well have tried to "wash a blackamoor white." The gunpowder was gunpowder still, as far as the look of it went.

Then I tried the microscope. The washed granules were intensely black, somewhat amorphous in appearance, and more or less angular. My power was not very high, and my knowledge of such very minute cellular structure was too small: I could not say whether the object was organic or inorganic. I was afterwards told that under a good microscope it

had been conclusively proved to be vegetable, *i.e.* a lichen.

I found by extended inquiry that the Portland, the Bath, and the Barnack (also lower oolite) stone were all liable to the blackening in the course of time. But the churches and buildings of sandstone, in that most smoky of towns, Wolverhampton, were not blackened at all. Evidently it was an effect peculiar to limestone.

I observed further, that in fluted columns, window-jambs, arches, &c., the blackness was always in proportion to the absence of sun-rays, and that the stone remained quite white where the sun shone full upon it. If any one will walk round St. Paul's, and compare the south with the north side, he will see the difference. Let him also notice the lines left white by the oblique rays of the summer sun on parts of the north wall.

In Bath, you may see whole ranges of buildings, like the Circus, so black on the sunless side, that in many cases the walls have been painted with black paint, as giving at least a more shiny and respectable black than my mischievous little lichen, which has a dingy, sooty, uncanny appearance.

In other parts you may see a wall on the north side perfectly black, while the east wall of the same building is perfectly white.

On the smoke-theory, this is inexplicable; on the light-theory, it is precisely what we might expect.

For if this blackness is really, as I now fully believe, due to the gradual growth of a lichen, we may conclude that it dislikes surfaces warmed and dried by the sun; and it is also to be inferred that the lime is a necessary part of its food. I examined a curious lichen, that grew in circular patches on the Barnack stone in Peterborough Cathedral, and I found that it had the property of extracting quantities of lime from the texture of the stone.

But its extremely slow growth, requiring a long series of years before complete blackness results, its very hard and stony texture, its amorphous form, and its extremely low organization,—the lowest, perhaps, that vegetable life can possibly possess,—render its history a very interesting one.

The practical result of the inquiry would be, to ascertain if Portland and Bath stone can be treated with some chemical solution, such as sulphate of copper, which would prevent the growth of the lichen, supposing it really to be such. It would be a valuable scientific discovery that a brush and a pail would restore surfaces that no water-washing will keep clean, and not only restore, but prevent from future discoloration.

If it be true that the beautiful Caen stone used in Paris does not become thus black, it must be due to causes well deserving of investigation. One cannot help hoping that some process of "pickling" building-stone may be discovered, which will tend to make churches and mansions less like an undertaker's hearse.

I have not given, in this brief paper, the substance of nearly all the observations, experiments, and reasonings, which led me to the result I have described. But I think some grounds of probability have been shown, enough to encourage those who are competent to prosecute the inquiry.

It is still open to conjecture, that some chemical change in the texture of the stone,—some oxidizing process gradually effected by the air,—may be the cause of the blackness. But the singular effect of sun-light in preventing it is a fact beyond all question, and one that must be borne in mind in forming any conclusion on the subject.

A CHAPTER ON MICROSCOPIC FUNGI.

(*Perisporiacei.*)

By Greenwood Pim, M.A., F.L.S.

THIS is a small but very interesting group of leaf parasitic fungi, and includes most of the forms popularly known as Mildews. In their immature condition three species of this order form the mildew of the rose, vine, and hop, respectively. That the vine mildew is a member of this group is to a certain extent an assumption, as its perfect fruit has never yet been discovered; and it is only by its analogy to, almost its identity with, the rose, pea, and hop mildews that it is believed to be the conidiophorous condition of an allied species.

All Perisporiacei consist at first of a woolly growth, consisting of delicate threads of concatenate cells, arising from a mycelium, which makes its way through the parenchyma of the stems and leaves of the plant on which it occurs. Under a low power of the microscope a mildewed rose-leaf looks like a delicate forest of crystalline vegetation. The threads break up very easily into their component cells, each of which, on meeting with a suitable nidus, immediately commences a separate existence, and, as is well known to rose-growers and others, spreads with a rapidity almost marvellous. In this condition the various species obtained the name of Oidium, and it is only comparatively recently that the identity of the Oidium with the fully-developed conceptacles of the mature form has been demonstrated.

In the case of the vine mildew, only the oidium or conidiophorous condition is known; the cells of these threads being known as *conidia.* In the other species, towards autumn a kind of spherical capsules are formed, each containing one or more sacs or asci, which include 2, 4, 8 or more spores. These conceptacles are usually furnished with curiously-formed appendages, threadlike, curved, hooked, horned, needle-shaped, forked, &c. By these characters, as well as he number of asci and spores, the species which were

formerly almost all included in the genus *Erysiphe*, have been divided into the following genera:—*Perisporium, Lasiobotrys, Sphærotheca, Phyllactinia, Uncinula, Podosphæra, Microsphæria, Erysiphe, Chætomium, Ascotricha, Eurotium.*

I will endeavour to describe the forms most usually met with, and would refer any one who wishes for fuller and more detailed information to Dr. Cooke's "Rust, Smut, Mildew, and Mould," and to his "Handbook of British Fungi," to the latter of which I am indebted for the generic and specific descriptions.

PERISPORIUM, *Kunze.* Perithecia (conceptacles) subglobose, without manifest mycelium or appendages; spores numerous. The three species described are far from common, and appear to approach in character the neighbouring order *Sphæriacei.*

LASIOBOTRYS, *Kunze.* Erumpent, central perithecia between fleshy and horny, proliferous, collapsing above, attached to radiating fibres; secondary perithecia ascigerous; asci cylindrical. There is only one species, which is parasitic on living leaves of Lonicera—*L. loniceræ*, Kze., which, though not common, appears widely distributed. It differs from the rest of the order in being subepidermal.

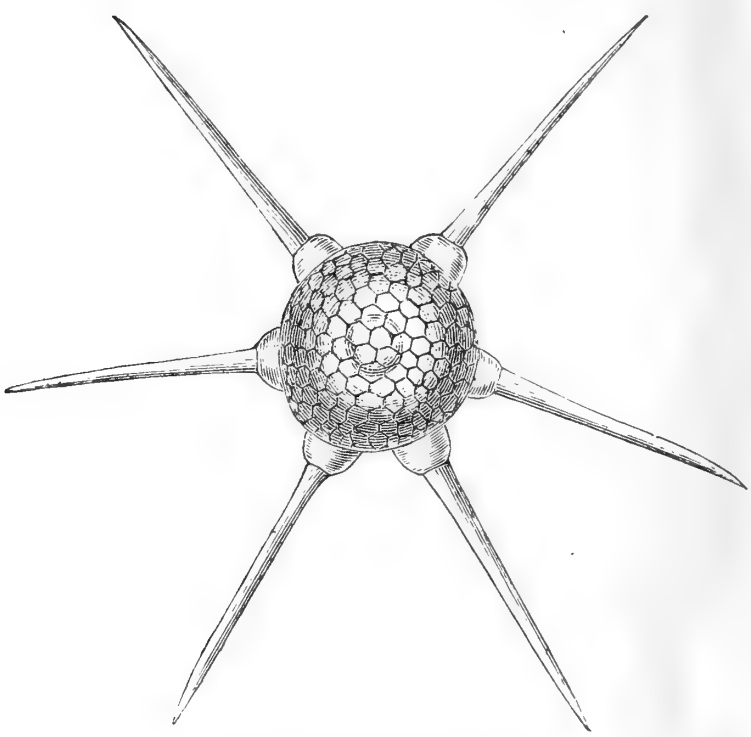


Fig. 110. *Phyllactinia guttata.*

SPHÆROTHECA, *Lev.* Perithecia globose, springing from an arachnoid mycelium, containing one many-spored ascus. Sphærotheca is distinguished from Erysiphe by having a single many-spored ascus, while the latter has several asci, each containing but few spores. Appendages numerous, floccose.

S. pannosa, Lev., the Rose Mildew, occurs on leaves, petioles, &c. of roses. The conidiophorous condition is extremely common, while the perithecia, which are very minute, occur but very rarely.

S. castagnei, Lev., which differs but little from *S. pannosa*, is found on Hops, Meadow-sweet, &c.

PHYLLACTINIA, *Lev.* Perithecia hemispherical, depressed; appendages needle-shaped, stiff, and brittle.

P. guttata, Lev. Conceptacles large, easily distinguished by their straight acicular appendages. Occasionally very abundant on Hazel, also on Ash, Elm, Alder, Birch, Oak, Hornbeam, &c. (fig. 110).

UNCINULA, *Lev.* Perithecia globose; appendages numerous, simple, or dichotomous, always hooked.

U. adunca, Lev. Perithecia scattered, small; appendages simple, hooked; asci 8–12, containing 4 spores. On leaves of Willows, Poplars, Birch, &c. Rather common (fig. 111).

U. bicornis, Lev. Mycelium effuse; perithecia rather large; appendages bifid, hooked; asci 8, containing 8 spores. Sycamore-leaves,—common, (fig. 112).

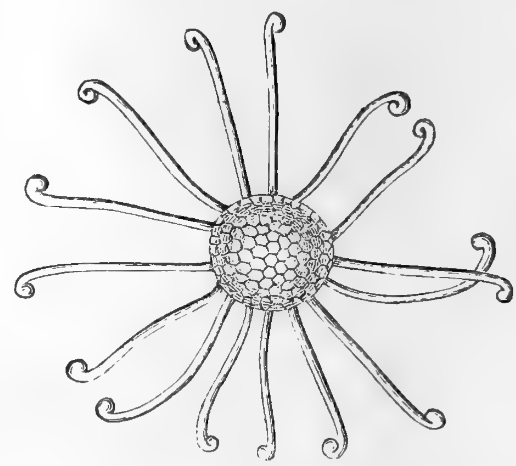


Fig. 111. *Uncinula adunca.*

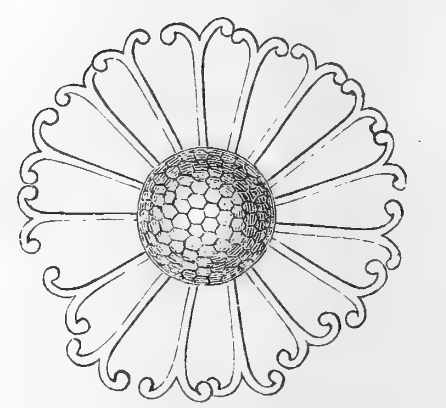


Fig. 112. *Uncinula bicornis.*

U. Wallrothii, Lev. Perithecia minute; asci 12–16, 6 spores; appendages very long, hooked, simple. Distinguished from *U. adunca* by the greater length of the appendages (fulcra).

PODOSPHÆRA, *Kunze.* Mycelium arachnoid; perithecia globose, containing a single 8-spored ascus; appendages few, repeatedly dichotomous, thickened at the extremity, hyaline.

P. Kunzei, Lev. Perithecia minute, scattered, globose; appendages 3 times the diameter of the perithecium. On plum-leaves.

P. clandestina, Lev. Similar to *P. Kunzei*, but appendages much shorter and more numerous. On

leaves of hawthorn, common ; the conidia stage very abundant in spring.

MICROSPHÆRIA, *Lev.* Perithecia globose, with many asci ; appendages dichotomous.

M. Hedwigii, Lev. Hypophyllous ; conceptacles minute ; appendages few, scarcely longer than the perithecia ; asci 4, containing 4 spores. On mealy Guelder Rose (fig. 113).

M. penicillata, Lev. Appendages 8–12, equal to diameter of perithecium ; asci 4, containing 8 spores. On Guilder Rose and Alder.

M. mougeotii, Lev. Appendages loosely dichotomous ; asci 12–16, 2-spored. On leaves of *Lycium barbarum*.

M. berberidis, Lev. Mycelium web-like, persistent; appendages 5–10, long, divaricate, obtuse; asci 6 ; spores 6–8. On Berberry,—abundant.

M. grossulariæ, Lev. Mycelium web-like; perithecia scattered ; appendages 10–15, vaguely dichotomus ; asci 4–8, spores 4–5. On gooseberry-leaves,—very common.

M. comata, Lev. Perithecia scattered, minute ; asci 8, ovate beaked, containing 4 spores. On Euonymus.

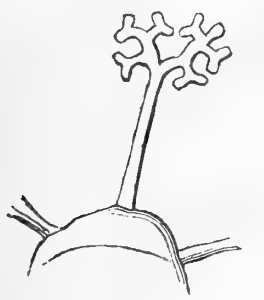


Fig. 113. *Microsphæria.*

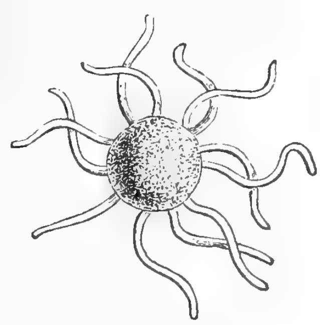


Fig. 114. *Erysiphe Montagnei.*

ERYSIPHE, *Hedw.* Mycelium arachnoid ; appendages floccose, simple or irregularly branched.

* Asci 2-spored.

E. Linkii, Lev. Perithecia minute, scattered ; asci 8–20, pyriform ; appendages interwoven with the mycelium.

E. lamprocarpa, Lev. Perithecia minute, globose, scattered or gregarious; appendages coloured; asci 8–16, shortly pedicellate. On Salsafy, Plantain, &c.

** Asci 3–8 spored.

E. graminis, D.C. Mycelium effuse, floccose ; perithecia large, hemispherical, at length depressed and semi-immersed ; appendages simple ; asci 20–24. On various grasses—autumn.

E. Martii, Lk. Mycelium web-like, often evanescent ; perithecia globose, varying from yellow to black ; appendages short ; asci 4–8, globose, with 4–8 spores. On Peas and Umbelliferæ,—very common.

E. Montagnei, Lev. Perithecia minute, globose ; appendages distinct from mycelium ; asci 8, spores 2–3 (fig. 114).

E. tortilis, Lk. Perithecia minute, globose ; appendages very long, 10 times diameter of perithecium ; asci 4, with 4 spores (fig. 115).

E. communis, Schl. Mycelium effuse, evanescent or persistent ; perithecia small ; appendages short ; asci 4–8, ovate-rostrate, 4–8 spores. On various Leguminosæ, Ranunculus, &c.

E. horridula, Lev. Mycelium web-like ; perithecia clustered ; asci 20–24, oblong, attenuated, with 3–4 spores. On Bugloss.

CHÆTOMIUM, *Kunze.* Perithecia thin, brittle, mouthless ; asci linear ; spores lemon-shaped.

C. elatum, Kze. Perithecium sub-ovate, hairs on vertex very long, interwoven, branched ; base of perithecium fibrose ; sporidia broadly apiculate. On straw.

C. chartarum, Ehb. Perithecium subglobose, black, surrounded by a bright yellow spot ; spores subglobose (fig. 116). On paper.

C. glabrum, B. Recorded by Berkeley, not described ; cf. "Grevillea," ii. p. 165.

C. murorum, Corda. Gregarious, glaucous blackish ; perithecium sub-globose, brown, hairs circinate, pulverulent, erect, septate ; spores oblong. On plaster.

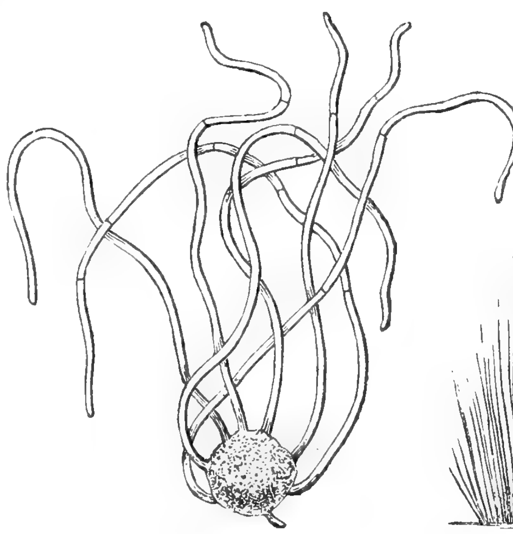


Fig. 115. *Erysiphe tortilis.*

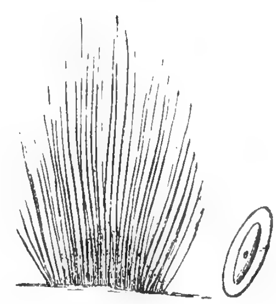


Fig. 116. *Chætomium chartarum.*

C. griseum, Cooke. Subgregarious or scattered, grey or cinereous ; perithecium globose, brown, submembranaceous; hairs long, elastic, circinate, pellucid; asci clavate, fasciculate ; spores lemon-shaped, colourless, endochrome granular. On old sacking. (Cooke in "Grevillea," i. p. 175.)

C. funiculum, Cooke. Perithecia scattered, subovate, black ; hair on vertex very long, dichotomous or simple, erect, slender, acute, black ; sporidia lemon-shaped, dingy brown. On twine. British Museum. (Cooke in "Grevillea," i. p. 176.)

ASCOTRICHA, *Berk.* Perithecium thin, free, mouthless ; threads loose, branched, conidiophorous ; asci linear ; spores, dark elliptic.

A. chartarum, B. Perithecia olive-brown. On paper.

EUROTIUM, *Link.*—Perithecia reticulated, vesicular, coloured, attached to mucedinous threads.

E. herbariorum, Link. — Perithecium spherical,

flattened, yellow, seated on radiating, branched, intricate flocci.

On various decaying substances, tan, &c. This is the fully-developed form of *Aspergillus glaucus*.

A word in conclusion as to mounting these fungi for the cabinet. They seem to be best put up in shallow varnish cells, filled with glycerine and water. Deane's gelatine, so invaluable a medium for most other vegetable preparations, is too viscid, the appendages enclosing a myriad of air-bubbles, which in gelatine are almost impossible to get rid of. Moreover, without a cell the covering-glass presses too closely and is apt to cause the perithecium to rupture from pressure. The *modus operandi* is a simple one. When the cell is ready, filled with dilute glycerine, scrape the leaf on which the parasite grows with a sharp knife, which will remove a good number of perithecia; push gently into the mounting fluid, and finish as in any other wet mounting.

ON TANKS FOR THE BREEDING AND MAINTENANCE OF MICROSCOPIC ORGANISMS.

IN the May number of SCIENCE-GOSSIP a correspondent seeks information on the subject of the establishing and management of tanks or receptacles for the preservation and development of microscopic organisms. To the microscopist it is a matter of some importance, and one of which there seems to be no record of any valuable, reliable, or actual experience. The subject is of deep interest, and possibly your correspondent and readers generally may consider the few following notes, founded on many years' experience, worth attention, more especially as the mode of establishing a permanent tank, containing microscopic plants and animals only, is not generally studied or even understood, the popular idea being that a collection of organisms found in the water of a rich pond turned into a glass vase will *at once* afford and possibly maintain and develop objects of interest and curiosity for immediate examination, when in fact a keeping or breeding tank requires many months, sometimes years, for the perfect development of its contents. No one could hope to raise the most interesting features (to a microscopist) of a garden in a few days. Time and the seasons are required to develop the mosses, lichens, fungi, and obscure growths to be found on good rockwork: the same prolonged causes developing life, apply (perhaps in a lesser degree) to the microscopist's breeding-tank; it is a question of patience. As a notable instance, the statoblasts of the most beautiful of fresh-water polyzoa (Lophopus) are frequently found in early autumn in the muddy sediments of ponds, rich in microscopic life. This sediment, transferred to a well-ordered perfectly-balanced tank, will produce the young polyps freely in the spring, and there are numerous instances of a similar character where time is a factor in the appearance of microscopic life in captivity.

In the practical management of these tanks two points are of essential importance: first, size, and, as regards light, position; secondly, the internal arrangements, and the character, requirements, selection, and management of the occupants, both vegetable and animal, so as to ensure development and reproduction.

The shape and place of occupation of the receptacle claim the first attention, and are of great importance. It is true that ordinary glass jars or vases of various sizes are continually used with more or less success in preserving living objects, but they utterly fail as breeding or developing places: their circular forms impede observation; again, their portability causes them to be frequently shifted into different aspects, which is fatal to steady development. They are too often placed in positions overwhelmed with light, when they rapidly become choked with filamentous algæ, destructive to the preservation of the higher microscopic forms. The proper adjustment of light seems to be the touchstone of success in the cultivation of organisms, both animal and vegetable. The vitality of some water-plants, under what would seem the most unfavourable, but, as it turns out, the most favourable circumstances, is very singular; the merest fragment of Nitella will live for months in a wine-glass of water, or even in a small test-tube, if kept in a cool and rather dark place, but abnormally excited by exposure to sun, light, and heat, it soon fades and collapses. This is a lesson of importance, as undoubtedly the same influences affect minute animals.

The tanks for the purpose in question should not be too large; a convenient proportion, and meeting all contingencies, is a vessel made of narrow iron frame-work, glass sides and ends, with slate bottom, measuring fourteen inches wide, fourteen deep, and twenty-eight inches in length. Two or more of these tanks are necessary: two are indispensable, as there is a marked difference in the character of the occupants of a tank facing a wall with only side light (and no sun) and another facing a window (north aspect) with occasional rays of setting sun. Besides these permanent and larger receptacles, *square* glass vases or vessels, such as are sometimes used for galvanic battery cells, of the capacity of three pints, are very valuable to contain objects dipped from the larger tanks for special observation on the study table.

The permanent tanks should be placed in position and never again moved. A good aspect is north-east, fronting a window catching an hour's early morning sunlight, but a better is against the wall of a room or hall with a full side-light, and no sun; the difference between the life contained in tanks placed in such positions is strikingly apparent. Of the internal arrangements anything approaching the idea to make it "pretty" should be studiously

avoided: nothing should be included but with the object of use—the more useful the more beautiful it will be; two pieces of goodly-sized stone or irregularly shaped brick should be placed nearly touching the front glass; these stones soon become covered with organisms, and may be so adjusted as to be within range of an ordinary magnifying lens. Two or three plants (not more) of vallisneria, or chara, are to be planted in *one corner* in well-washed gravel, banked up with one of the pieces of stone; the other part of the floor of the tank should be left bare, to facilitate the picking up, free of sand or gravel, of anything that may appear. If a pond be accessible, three parts of the tank are filled with water from it; if it be cloudy or even muddy the result may be more favourable. After being left in repose for at least a week, the character of the contents (if the pond be fairly productive) will be seen; the water will be clear and probably reveal a variety of common objects, such as larvæ of insects, entomostraca, planaria, and hydræ; in a week or more vegetable growth will appear, covering every portion of the interior. The tank is now in a condition to be inoculated with whatever choice objects can be obtained, the result of special and favourable gatherings, and this should be repeated frequently; the front glass must be occasionally cleaned with a sponge tied to the end of a cane, but on no account be tempted to touch the sides or back: the water will soon become as clear as crystal, however muddy it may have been when first introduced. The pieces of stone will show signs of vegetable growths, with patches of such forms of infusoria as vorticellæ and stentors. The waste from evaporation must be supplied by additions of pond water (the richer the better), and such a tank will be, in a month or two (not before), a marvel of microscopic beauty and interest. The untouched back glass will be covered with a dense mantle of dark-green velvety vegetation, in the midst of which will be discovered groups and patches of the fixed infusoria, and it is essentially the habitat of the polyzoa; hydræ, and the rarer rotifera philodina, even melicerta and stephanoceros, may be found under such circumstances, to say nothing of the countless tribes of free infusoria, ever ready for observation in all their various phases of existence, and such conditions will preserve and increase them indefinitely. Enemies to eliminate are larvæ of insects (but these soon disappear naturally), the fluviatile arachiadæ, and the larger molluscs; the latter in browsing through the vegetation on the glass are apt to destroy perhaps a favourite group of stentors. Other enemies are the floating filamentous algæ; they should be removed, but if the tank be well watched as regards light no trouble in this respect may ensue. Nothing ought to be *planted* in the middle, as it is of importance the back glass should be clearly seen, and much may be lost if anything impedes this view. It needs hardly be said that the water must never be changed. Tanks so established will greatly improve by time, even when it extends to years. It is worthy of note, as a matter of practical observation, that a great excess of animal life (of a certain character) much conduces to the development and well-being of microscopic life. In a tank measuring fourteen inches deep by fourteen wide and twenty-eight inches long, five full-grown Mexican axolotls (nearly as large as water-rats) have existed and thriven for more than four years. In every part of this tank there are swarms of crustacea, infusoria, and rotifera, and the back glass facing a wall is covered with the velvet-like growth, shading off into patches of pale browns and purples, imbedded in which are considerable masses of living animal objects. It would seem as if the rejectamenta of these axolotls (they are fed once a week with strips of raw beef) is conducive to the development of life. In large ordinary tanks with growing plants of vallisneria, and not devoted to the special object of these notes, it is desirable to have a piece of floating wood; it will in a few weeks or months form the nidus or habitat of many strange organisms. Vegetable forms requiring running or moving water, as desmids, volvox, &c., cannot be reared or even kept in captivity. Much might be said of collecting to supply tanks with objects did space admit, but hydræ and countless forms may be procured in abundance by the very simple process of bringing in a handkerchief-full of duckweed, washing it thoroughly in a pan, rejecting the weed, and pouring the resulting water into the tanks.

Crouch End. E. D.

HOW TO USE THE MICROMETER.

By F. Kitton, Hon. F.R.M.S.

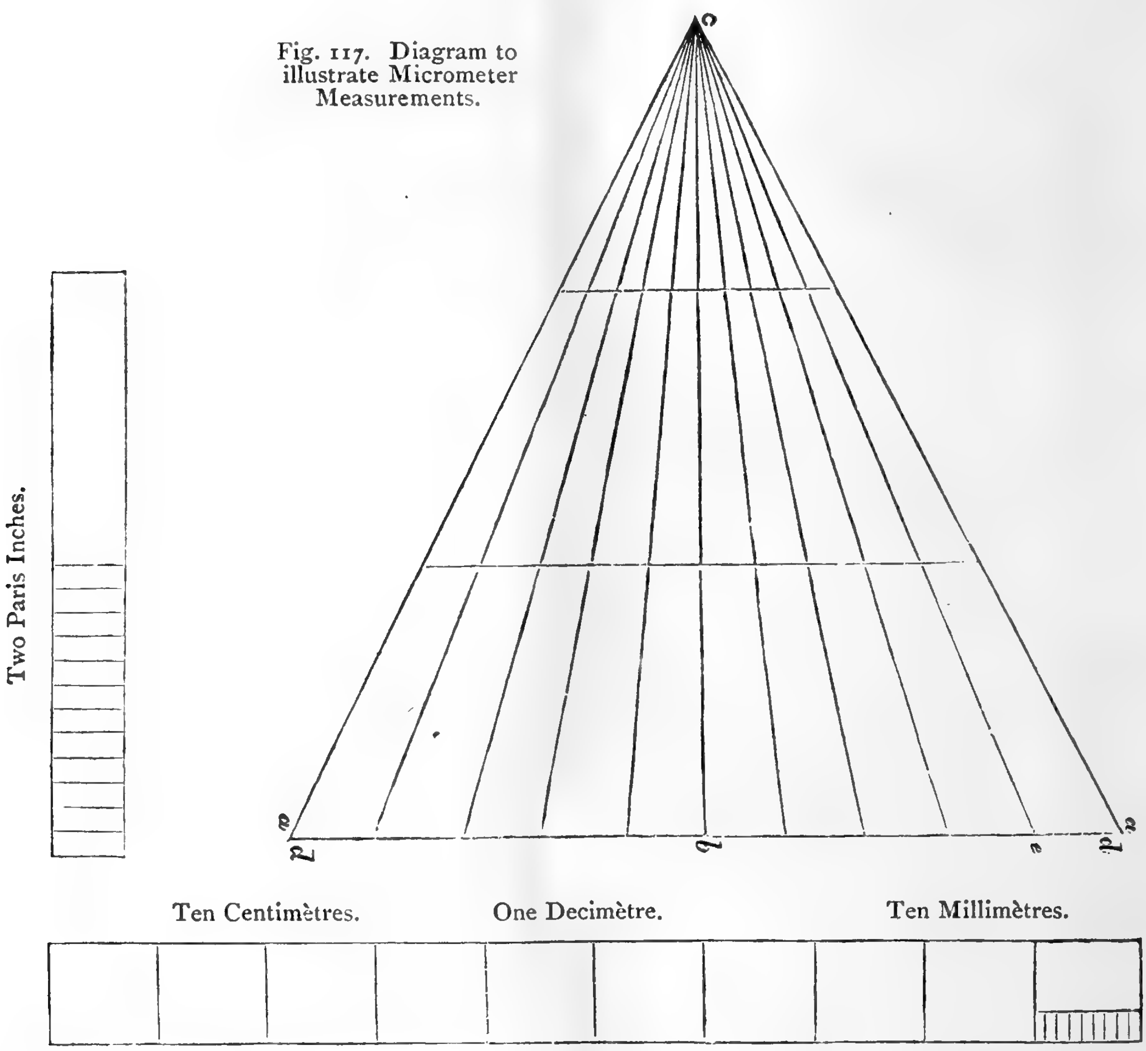
ALL interested in microscopic studies have been more or less inconvenienced by the frequent absence of a scale of measurement attached to the figures; this is a great blemish in that otherwise valuable work, "The Microscope," by Dr. Carpenter. This in many cases was no doubt unavoidable, no scale having been given with the original figures. As the measurement of microscopic objects is by no means difficult, every one using the microscope should make it a rule to ascertain the dimensions of the objects he is examining. The only additional apparatus required is some form of camera lucida: personally I prefer Wollaston's; others give the preference to Beale's neutral-tint camera lucida (the former costs 21s., the latter 7s. 6d.), and a micrometer ruled in $\frac{1}{100}$ and $\frac{1}{1000}$. The chief difficulty in using the camera of Wollaston is bisecting the pupil of the eye with the edge of the prism; if this is not carefully attended to either the paper or the object becomes invisible: practice soon overcomes the difficulty. In using either form of camera it is necessary that the body of the microscope should be horizontal.

In using the camera lucida two things have to be considered: the distance of the prism or the reflector from the object, and its distance from the paper. (In my own instrument the edge of the prism with B ocular, and ¼-in. Ross objective, is exactly 12 inches from the object; this distance with the paper 10 inches from the edge of the prism gives a magnification of 369 diameters.) As the length of the body and the magnifying power of the objectives and ocular are variable, it is best to construct a scale for the purpose of ascertaining in the first instance the amplification employed; the most convenient is the following: Rule a line 10 inches in length, *a*, (fig. 117), and from the centre of this rule another line, *b*, of the same length at right angles to it; carefully divide these lines into inches and tenths, then rule lines commencing at *a* to the point *c* parallel to the vertical line *a*; rule nine other lines 1 inch apart: each of these divisions represents one hundred diameters. The inner margins of the lines *b c* should be divided into tenths, and we shall then have a series of diameters increasing by tenths 100, 110, 120, &c. This space between the lines *a* and *e* should be ruled as accurately as possible with lines $\frac{1}{10}$ of an inch apart; this will give measurement to the ·0001 of an inch. I always prefer using such diameters as are easily divided, viz., 100, 200, 300, 400, &c. With my ¼ objective I obtain a range of from 300 to 500 diameters by using the A B and C oculars, and adjusting the amplification by means of the draw tube or the elevation of the microscope. A memorandum may be kept of the ocular used, the length of tube, &c., but I always measure off a ·01 with micrometer, which should of course represent 1, 2, 3, 4, or 5 inches, according to the amplification employed.

The eye-piece micrometer, in its simplest form, consists of a disc of glass upon which a series of equidistant lines are engraved; this is placed on the diaphragm in the ocular, the lines being magnified by the eye-lens. The distance of these lines is not important, but, whatever their distance, they must be made to coincide with the divisions on the stage micrometer; when this has been done the object is placed on the stage, the number of divisions occupied by it gives the diameter in parts of an inch or millimètre, according to the divisions of the stage micrometer. This method, although somewhat less troublesome than that just described, is not so accurate, and if the object is somewhat opaque (e.g., *Aulacodiscus formosus*), the divisions on the eye-piece micrometer are very indistinct.

For very delicate measurements eye-piece micrometers with fine screw adjustments are used, but for ordinary measurements the camera lucida and stage micrometer will be found sufficiently accurate.

Fig. 117. Diagram to illustrate Micrometer Measurements.



Microscopic dimensions in England and America are usually given in parts of an inch; Continental observers now generally employ some division of the millimètre, such as ·1, ·01, ·001; the latter is sometimes written thus: 1 μ (μ = 1 millième) ·001 of an English inch = 25 μ ·399. An English inch contains 25 mm. ·3995. A millimètre may be roughly estimated as being equal to $\frac{1}{25}$ of an inch.

Ehrenberg, Kützing, and the earlier microscopic observers used fractions of the Paris line, or the $\frac{1}{12}$ of a Paris inch; the latter equals 27 mm. ·12; the Paris line equals 2 mm. ·255. Rees gives the Paris line ·088815 of an English inch; the nearest vulgar fraction to this is 2-23rds = 087121, differing by less than 1-500th of an inch. Practically the French inch is equal to $1\frac{1}{16}$ English inch.

The scale used by Ehrenberg was 1-25th of a Paris line, magnified 300 diameters equalling two Paris inches in length.

NOTES ON THE RHODODENDRON.

On Saturday, the 1st of June, on our visit to the Rhododendrons, at Cobham Park, my attention was drawn to the form of the flower by a query from one of the party as to how fertilization was brought about, seeing that the stamens and style all pointed upwards, and the style was greatly exserted beyond stamens. I was thus led to pay particular attention to the point; and, I think, was enabled to arrive at a just solution.

A very small amount of attention demonstrated quite clearly that the plant is proterandrous, *i.e.*, that the stamens arrive at maturity before the stigma is in a receptive condition; and that, therefore, although the flowers are bisexual, they are to all intents and purposes unisexual, as the stamens of a given flower cannot fertilize the ovary of the same flower. This might be inferred from the size and showiness of the flower, as such plants, it has been clearly shown, are usually entomophilous, *i.e.*, are fertilized through the agency of insects. We were soon enlightened as to the peculiar fitness of the upturned style and stamens for the purpose of securing cross fertilization by the agency of large honey-loving insects, such as the bee. While examining a cluster of flowers a large bee or bee-like insect was seen to enter a flower; and, alighting *upon* the stamens, to apply its long proboscis to the upper part of corolla at a point about half-way down the tube. An examination of other flowers showed in every case at this part a large drop of fluid matter resembling dew or rain, but which proved, on tasting, to be honey.

The *modus operandi* of fertilization was now patent enough. Large insects, such as the bee, are attracted by the honey; and, from its position within the tube of the corolla *on the upper side*, and from the form and position of the *up-curved* stamens, are unable to reach it without, in the male condition of the flower, literally dusting the under-side of the thorax and abdomen with pollen, and without, in the female condition, where the style protrudes beyond the now pollenless stamens, depositing a portion of their treasure upon the expanded glutinous stigma. Thus, as they flit from flower to flower, in search of honey for their own benefit alone, do these insects unwittingly carry on a work that is absolutely essential to the continuance of the specific life of the Rhododendron.

We may thus in a general way see and admire the mutual adaptation of insect and flower for each other's good, but a closer examination of the flower will reveal to us many small modifications in the form of corolla, stamens, ovary, &c., which cannot fail to increase our admiration.

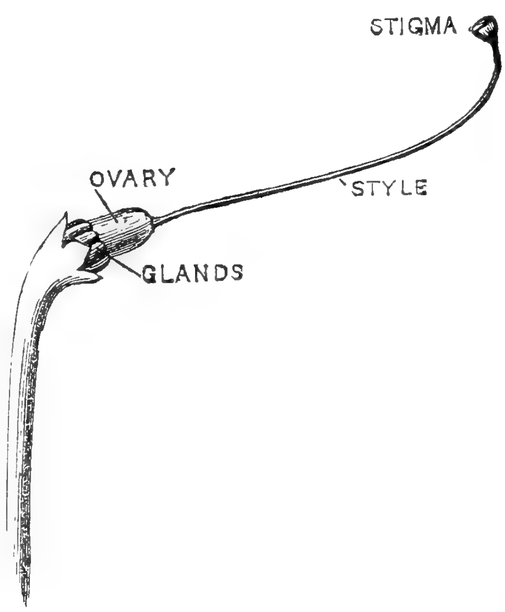


Fig. 118. Pistil of Rhododendron.

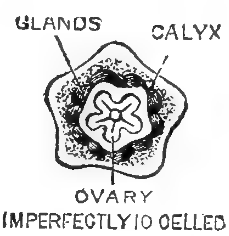


Fig. 119. Ovary of Rhododendron.

Fig. 120. Stamen of Rhododendron.

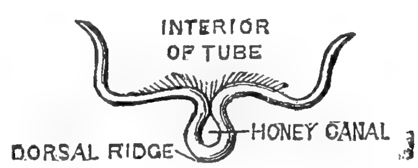


Fig. 122. Cross section of tube of Corolla.

Fig. 121. Glandular hairs at base of Stamen (mag.).

First, with regard to the colour of the corolla. This is of an almost uniform tint, varying in different plants, from deep rose-colour to pale pink, or even white. Within the tube, however, on the upper side a number of yellow oblong splashes will be found forming more or less distinct lines, clearly converging upon the drop of honey already alluded to. Sir J. Lubbock has shown by direct experiment that insects profit by experience, and having once learnt that certain lines or striæ lead to their food, use them as guides in their future excursions. Hence, doubtless,

the *raison d'être* of these lines or splashes in the Rhododendron.

Secondly, with regard to the form of the corolla. This, as in all Ericacæ, is monopetalous. When pulled off and examined, it is found to be curiously folded and plaited, especially near the base of the tube on the upper side. A cross section taken near the base is fairly represented by fig. 122 (magnified). It will be seen from the figure that the dorsal fold is so deep and perfect as to form a tube or canal. This channel gradually shallows out at the point where the honey is always found. What is its use? At first sight it appears as though the honey were secreted by the corolla itself at the point where found, but such is not the case. On pulling off the corolla, the honey will be seen oozing from the upper side of the base of the ovary. The use, then, of this fold appears to be to act as a tube for the passage of honey from the base of the corolla to a point nearer its mouth where it is more readily accessible to insects of a large size. The honey, doubtless, passes up this tube by means of capillary attraction.

The stamens are very peculiar, as will be seen from fig. 120. The lower half is thickly covered with stiff glandular hairs of very various forms and lengths. Some of these forms are represented in fig. 121. One use of these hairs is, perhaps, by firmly interlocking, to strengthen the stamens, and enable them the better to resist the pressure of insects alighting upon them; but the principal one, I should think, is by means of their crowding and intertwining, to prevent smaller insects, that would be incapable of carrying on the work of fertilization, from penetrating to and carrying off the honey, which is the incentive to the visit of those larger insects that are capable of performing the task. The bottom of the stamens, as shown in fig. 120, is free from hairs, and rests in a groove in the hypogynous disc that surrounds the base of the ovary. This insertion in a groove and close application to the ovary cannot fail to give additional stability and strength to the stamens as a whole, while it most effectually prevents any insect from arriving at the source of the honey.

The imperfectly ten-celled ovary, with its surrounding secreting disc, is represented by fig. 119. The upper two lobes only of this disc, which are larger than the rest, appear to be concerned in secreting, or, at all events, in pouring out the honey.

This paper is written, not as an exhaustive account of the flower of the Rhododendron, but as an incentive to further examination by others. As my opportunities of observation are small, I feel sure that those more favourably situated may, by a little attention, show us many curious and highly-interesting points that I have altogether overlooked; and I, for one, should be very glad to get a fuller and more perfect account of this plant.

Rochester. J. HEPWORTH.

ACCLIMATIZATION OF PALMS.

By STAFF-SURGEON R. NELSON, R.N.

PLANTS differ greatly from animals in the closeness of their adaptation to meteorological and other conditions; hence, on the one hand, while in England, we can have parrots, monkeys, lions, tigers, and other tropical and sub-tropical animals, live with us during winter, and even the polar bear look as pleased as a bear can look during our hot summer months; we lose, on the other hand, the enjoyment of many beautiful wild flowers and magnificent forest trees which enliven the scenery and greatly enhance the pleasure of the traveller abroad.

Who that has travelled much does not remember the pleasure, nay, the rapture which he felt as he neared his first foreign port—say Madeira, for instance—in beholding the luxuriant "feathery palm-trees rise," as Heber sung when he linked them together with other of our earthly conceptions of "the better land." They are undoubtedly the first objects which forcibly strike the wanderer, and enable him to realize that his dear old home is far behind, and that he is, indeed, in a distant land. There is nothing so thoroughly foreign to the eye, and few objects in nature more attractive. The long-tailed Celestial, the almond-eyed "Jap," and the black-skinned negro, have been long familiar in our streets, but the palm stands out in broad relief as the first novelty which attracts attention abroad.

Having lately spent some months in Shanghai, I have been led to these remarks by observing, during the present severe winter, how well the few palm-trees planted there have withstood the rigour of the climate, and was first forcibly struck with the subject when, one bitterly cold morning, a friend called my attention to the almost anomalous condition of nature, that the palm-trees were covered with snow; and very pretty objects they were.

What *genus* or *species* of Palmaceæ they belong to I cannot at present discover, but doubtless many readers of SCIENCE-GOSSIP know which are the hardiest of the order. That the specimens planted along the Bund of Shanghai are as graceful as the lofty cocoa-nut trees of Ceylon, or the Sago-palm of Borneo I do not maintain; but they are well worthy of the attention of those interested in the acclimatization of plants, for few things would add more to the beauty of our parks, or better set off a landscape than endogenous trees, of which our climate has, or is supposed to have, deprived us.

Shanghai is situated on the Woosung river, about twelve miles above its junction with the mighty Yang-tze-Kiang; the country around is perfectly flat, and the soil alluvial. Although so far south as 31° N. lat., 20° below the south of England, the winter is rigorous, and altogether the climate bears a most remarkable contrast to places in the western hemi-

sphere situated in nearly the same parallel of latitude *e.g.*, Malta and Bermuda.

The following table shows the average mean monthly temperature of several years past :—

January ...	40° Fah.	July	83° Fah.
February ...	42° ,,	August ...	83° ,,
March ...	50° ,,	September	76° ,,
April	58° ,,	October ...	67 ,,
May	69° ,,	November ...	55 ,,
June	76° ,,	December ...	47 ,,

During the recent winter there has been at least ten days continuous skating, and the thermometer during the month of January was frequently below 20° Fah. or 12° below the freezing-point. During the last six months there has been an extreme range of 82°, *i.e.* from 99° to 17°.

This subject is well worthy of enlargement and development, but meantime this is perhaps enough for Gossip.

SKETCH OF THE GEOLOGY OF DUBLIN AND WICKLOW.

By Wm. Hellier Baily, F.L.S., F.G.S., M.R.I.A., &c.

The metropolis of Ireland is most favourably situated with regard to its position, its eastern extremity being bounded by the sea, to the north-east the peninsula of Howth forms the limit of Dublin Bay in that direction, to the south that of Kingstown and Dalkey; south of Dublin the granite range of mountains are a conspicuous feature in the landscape.

Of the igneous rocks, granite, the most important, is well displayed near Dublin, commencing about three miles south, extending in a south-westerly direction for a distance of twenty-nine miles to near New Ross, in the county of Wexford, with an average width of eight or ten miles, and a maximum, at one part, of eighteen miles. It forms the Dublin mountains, rising to an elevation of 1,763 feet from the sea-level, above the Three Rock Mountain at Fairy Castle. The lower hills, near the sea-coast, such as that of Killiney, are 480 feet, and Dalkey 472 feet, in height. The outline of this range shows a succession of gently-undulating and rounded eminences, descending more rapidly towards the sea.

In the adjoining county of Wicklow the mountains rise to a greater height; Lugnaquillia, in the southern part of the county, being the highest, is 3,040 feet elevation, consisting of a mass of mica schist resting on the granite; all the loftiest parts of the adjacent mountains are also composed of mica schist.

The granite may be seen along the coast from Blackrock, south of Dublin, to Kingstown and Dalkey; from the latter place it has a superficial breadth of about eight miles. From the quarries at Dalkey Hill was obtained the stone used in the construction of the harbour and piers at Kingstown, about 6,000,000 tons being used in the formation of the two breakwaters. A large quarry in the town of Kingstown was also extensively worked for material used in the construction of the harbour and piers at Kingstown; other quarries have been opened on the eastern side of the Three Rock Mountain for supplying stone for building purposes and for flagging.

The Killiney and Dalkey granite is coarsely crystalline, varying somewhat, however, in different places. The Rev. Dr. Haughton, F.R.S., &c., has fully described the Dublin and Wicklow granites in a memoir of the Lower Palæozoic and associated Igneous rocks of the south-east of Ireland. ("Trans. Royal Irish Acad.," vol. xxiii., 1859, pp. 564, &c.) Veins of a closer and whiter texture, in which the mica is scarcely or not at all perceptible, are frequently found to traverse the granite of this district; it is called *Eurite*, and is evidently intrusive; occasionally it assumes larger dimensions than that of mere veins. Black mica (*Lepidomelane*) is not uncommon in this granite; a remarkable plumose variety of white mica (*Margarodite*) has been found at Ballybrack. In the Dalkey quarries it is not unusual to find perfectly-formed crystals of black quartz in the joints; fine crystals of Tourmaline are also occasionally met with in the granite of Dalkey, and the mineral called *Killinite*, from its having been found in the granite of Killiney and also at Dalkey.

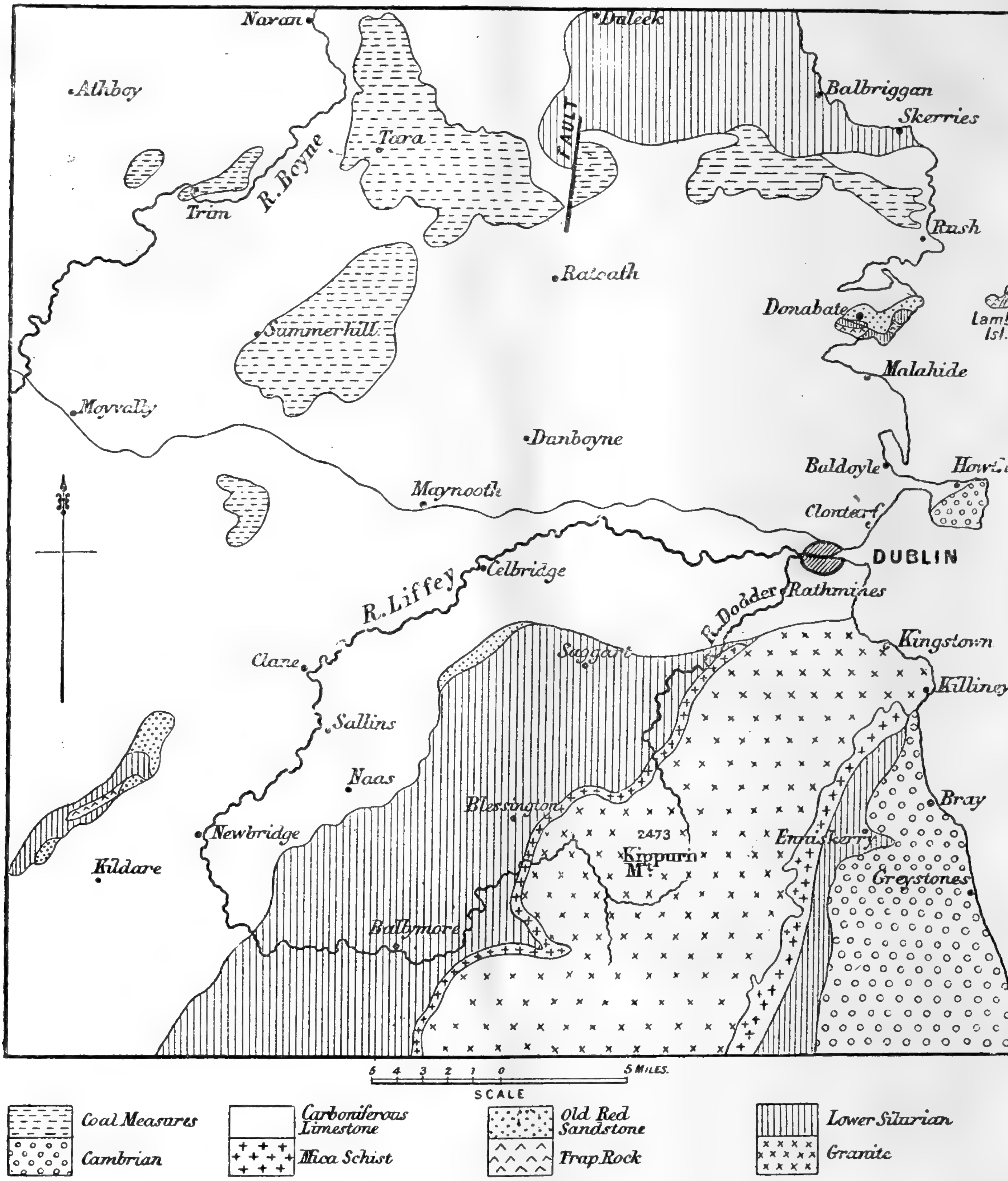
Metamorphic Rocks.—Mica schist, or altered Lower Silurian slates, these again blending into unaltered Lower Silurians, flank the granite from a point near Killiney to near New Ross, in the county of Wexford, spreading out, as shown on the southern boundary of sheet 121 of the Geological Survey maps to a breadth of over four miles. The junction of the Granite and Metamorphosed Slates is clearly observable along the sea-shore under Killiney Hill, at Roche's Hill, and to the west of Killiney Park; in the road and railway cuttings of the neighbourhood; as well as their metamorphism into mica schist, which often contains crystals of chiastolite.

The manner in which the granite has been forced into the slates, penetrating them in wedge-shaped masses and veins, may be observed on the shore at this place. From the Killiney Hills a fine view of the Bay of Dublin, with Howth to the north and Bray Head south, may be seen.

The Scalp, about two miles north of Enniskerry, and about three miles south of Carrickmines station, on the Dublin, Wicklow, and Wexford Railway, is a picturesque pass, the granitic rocks showing great erosion; its junction with the mica schist may be readily observed.

In the glen of the river Dargle, near Enniskerry

Fig. 123.



GEOLOGICAL MAP OF THE NEIGHBOURHOOD OF DUBLIN.

the prominences which are called "the Burnt Rock," "the Lover's Leap," and "the View Rock," are of quartz rock, associated with the Cambrian formation. The well-known Powerscourt Waterfall, nearly 300 feet high, in the same river, is about four miles south-west of Enniskerry, in the Powerscourt demesne, where the metamorphic rocks are prevalent.

Of the stratified or sedimentary rocks the lowest Palæozoic formation is the Cambrian, which is composed of green and purple grits and slates, often interstratified with masses of dull yellow or brown quartz rock, and having a total thickness of several thousand feet.

Strata of this character form the bold and rugged headland a little south of Bray, rising to a height of 793 feet. The outline of these hills when viewed from the north is very picturesque, with the prominent peaks of the Great and Little Sugarloaf Mountains (formed of quartz rock), in the background. The Great Sugarloaf, four miles south-west of Bray, rising

to a height of 1,659 feet, and the Little Sugarloaf, about two and a half miles south of Bray, to 1,120 feet.

This Cambrian district of North Wicklow, commencing somewhat north of Bray, and including part of the river Dargle, extends to near Wicklow, a length of seventeen miles, spreading out to seven or eight miles.

At certain places in the district this formation contains a very distinct, though specifically small, assemblage of fossils. Two species of *Oldhamia* (named after Professor Oldham), *O. antiqua* and *O. radiata*, have been described and named by the late Professor E. Forbes; they are confined to Irish strata, and occur in considerable abundance at several places in the rocks of Bray Head; at Graystones, on the coast three miles further south; and at Carrick Mountain (1,260 feet high), north of Rathdrum. These fossils were believed, by Professor Forbes and the late Professor J. R. Kinahan, M.D., to be allied to Sertularian zoophytes; other scientific observers consider them to have been plants, probably marine algæ, allied to lime-secreting nullipores.

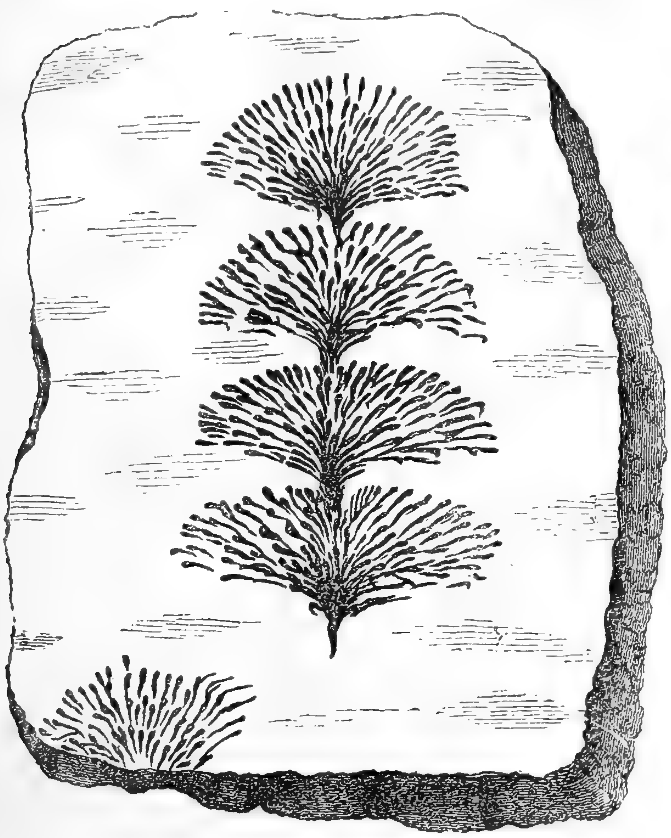


Fig. 124. *Oldhamia radiata.*

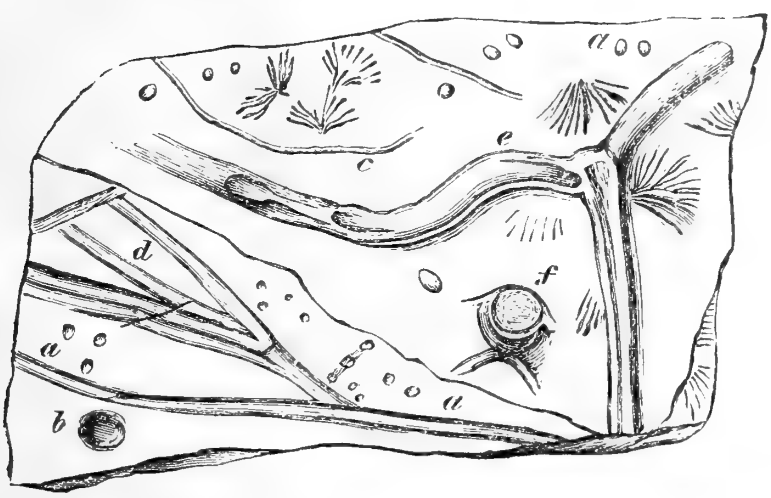


Fig. 125. Tracks and burrows of *Arenicolites sparsus,* copied from Baily's "British Fossils."

Fig. 126. Burrows of *Arenicolites didymus.*

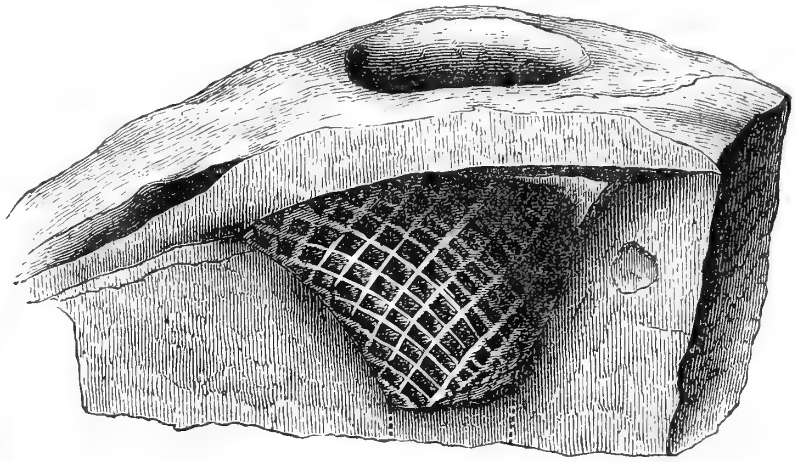


Fig. 127. Burrow of *Histioderma Hibernicum.*

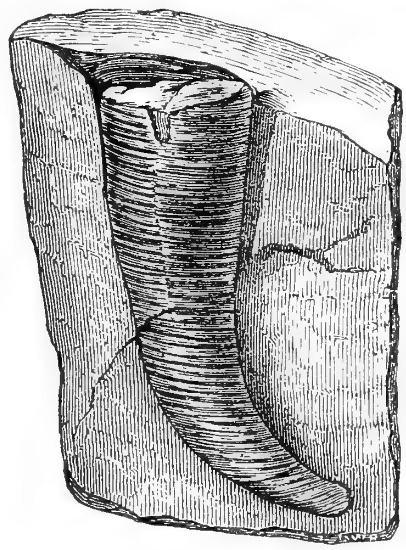


Fig. 128. Extremity of tube of *Histioderma Hibernicum.*

Accompanying the *Oldhamia* are evident remains of marine annelids, which burrowed in the sand of that period, producing tracks penetrating the beds in a vertical and horizontal direction; they correspond with those described by the late Mr. Salter from the Longmynds as *Arenicolites didymus,* and *A. sparsus* (probably identical species); some of them occur in pairs of double openings, which pass

vertically through the beds; others as tracks running along the surface. Larger tubular casts passing vertically through the beds have been described by the late Dr. Kinahan as *Histioderma Hibernicum*.

At the top of the hill in Kilruddery demesne, belonging to the Earl of Meath, the surfaces of the quartz rock, associated with the Cambrian formation, are distinctly rounded and scored by glacial action.

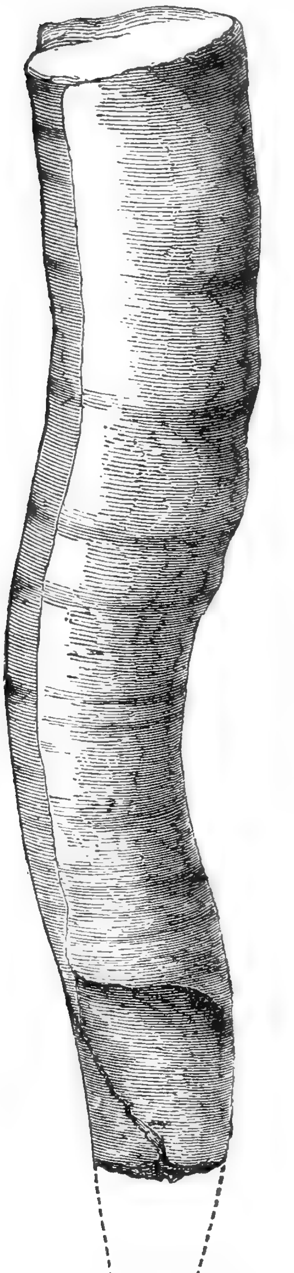


Fig. 129. Large Tubular cast of *Histioderma Hibernicum*.

The Dublin, Wicklow, and Wexford Railway is constructed through this mass of rocks at Bray Head by a series of short tunnels and cuttings, and by bridges or viaducts, exposing sections of strata and exhibiting various geological phenomena.

The Lower Silurian rocks, south of Dublin, are only fossiliferous at a few localities; near Rathdrum, in the county of Wicklow, at Slieveroe, are strata of Caradoc Bala age, from which have been obtained the following characteristic fossils:—*Favosites fibrosus*, *Orthis testudinaria*, *O. actoniæ*, *Leptæna sericea*, and *Euomphalus perturbatus*; the Trilobites *Calymene Blumenbachii*, *Homolonotus bisulcatus*, *Trinucleus concentricus*, and *Beyrichia complanata*.

Cambrian strata are also the prevalent rocks on the peninsula of Howth, county of Dublin; they are associated with quartz rock, as at Bray. The rocks here are more slaty in composition, and the presence of *Oldhamia* is rare; the late Professor Kinahan believed he had discovered it in what are called the "Puckrocks," on the shore east of Howth, accompanied by tracks, resembling those observed at Bray; the highest point, Ben Howth, is 560 feet high. In the demesne of the Earl of Howth these rocks are well seen, and a picturesque view may be obtained of the island of Ireland's Eye, which is composed of similar strata, Cambrian and quartz rock. In the further distance may be seen the island of Lambay. The drift at Howth, in the cliffs over Balscadden Bay, is of considerable thickness, containing fragments of marine shells. On the Dublin mountains, at an elevation of more than a thousand feet, marine shells have been collected and described by the Rev. Maxwell Close from two places ("On the Elevated Shell-bearing Gravels near Dublin," *Journ. Geol. Soc. of Dublin*, vol. iv., New Series, p. 36). At Bohernabreena, near the river Dodder, beyond Fort Bridge, about six miles S.W. of Dublin, marine fossils were also obtained from the drift-gravel and sand by the late Dr. Kinahan (*Journ. Geol. Soc. of Dublin*, vol. viii. p. 87).

The formation upon which Dublin is built, and its immediate neighbourhood, is Upper Limestone; this formation, however, being for the most part covered by drift, composed of sand and gravel.

Sections in railway cuttings, rivers, and canals, and various quarries, show the character of the rock to be a dark earthy limestone, technically termed calp; fossils in this rock are comparatively rare. The Lower Carboniferous Limestone appears at Raheny, continuing to Howth, where it is more fossiliferous. At Balscadden Bay, north-east of Howth, Lower Limestone shale, similar to the rocks forming the low cliffs on shore a little south of Malahide, may be seen. It rests unconformably on Cambrian strata, containing numerous corals, crinoids, brachiopods, &c.

The Limestone at Howth is compact and thick-bedded, frequently magnesian, and occasionally assuming a perfect dolomite.

The picturesque scenery of Howth (reached by a branch of the Great Northern Railway from Amiens-street terminus), is of considerable interest, especially where seen from the road round the east cliff, and through the Earl of Howth's demesne, the more elevated parts (towards the Baily Lighthouse) being nearly as wild in character as some parts of Connemara.

The rocks forming the low cliffs on the shore south of Malahide, Lower Limestone shale, contain an abundance of fossils, corals, crinoids, and mollusca, especially brachiopoda. On the surface of some of the beds, where weathered by sea and atmospheric action, the characteristic coral, *Lithodendron junceum*, may be seen in bunches attached to a large bivalve shell, which was named by Professor McCoy *Pleurorhynchus fusiformis*. The quarries of Lower Limestone near Malahide, at Feltrim, a little to the south-west, and Sea Mount, south-east, has supplied a large number of species.

Still farther north, at Portraine, reached by the same railway from Donabate station, eleven and a quarter miles from Dublin, the prominent rocks are Lower Silurian, of Caradoc Bala age, similar strata also occurring at the Island of Lambay, two and a half miles east.

The beautiful rock called Lambay Porphyry, which forms a large proportion of the Island, composed of pale green crystals of orthose felspar, in a base of a dark green colour, also occurs on the opposite Portraine coast.

The Lower Silurian Limestone on this coast, as at

Lambay, is a very dark and compact grey rock, very fossiliferous in certain places. Corals are abundant, projecting in relief, where weathered. Still farther north on the coast, at Loughshinny, reached from the Rush and Lusk station of the same railway, the Lower Coal Measure shales appear with characteristic fossils, *Posidonomya Becheri* and *Goniatites sphæricus*, the first-named shell defining the horizon of the junction beds between the Lower Coal Measure shales and Upper Carboniferous Limestone.

North of this, on the shore at Balbriggan, may be seen black slates, with numerous Graptolites; these are principally single-celled species referred to *G. Hisingeri*. At the Cardy rocks, a little more north, fossils indicative of Caradoc age, are found in brown shales, of which several species have been enumerated.

The great Irish Deer (*Cervus megaceros*) has been found near Dublin, associated with the Reindeer (*Cervus tarandus*); it existed formerly in considerable numbers in this neighbourhood, as in other parts of Ireland. The Bog of Ballybetagh, near Kiltiernan, on the boundaries of the counties of Dublin and Wicklow, has supplied a great many examples of this stupendous animal. Professor Oldham, in a paper read before the Geological Society of Dublin, in 1847* records the discovery of the remains of at least thirty individuals, accompanied by the head and antlers, with other bones of a Reindeer (*Cervus tarandus*), in the cutting for a drain in this bog. Dr. A. Carte, in a paper read before the same society,† gives an account of a skull and antlers of a Reindeer from the Curragha Bog, near Ashbourne, county Dublin (Sheet 101, Geol. Survey Maps). This fine example, in the Royal Dublin Society's Museum was found in a very similar deposit to that previously mentioned, imbedded in marl and clay, under four or five feet of peat. From the peculiar shape of the brow antler, these specimens are proved to belong to the Caribou, or "Barren ground" variety, which now inhabits America between the sixty-third and sixty-sixth degrees of north latitude, in the winter; migrating to the coasts of the Arctic Sea in summer. It is, therefore, very interesting to meet with evidence of the former existence of this variety of the Reindeer in Ireland.

Glacial action is evidenced by scorings of the rocks, which are observable at Kilruddery, Bray, and at Portraine; by the transport of large masses, such as that of granite, on the top of Bray Head, and the distribution of boulders of various formations, in the drift along the railway, near Killiney.

The Eskers of Ireland are frequent over all the low central plain; they are continuous banks of drift, composed of sand and gravel, sometimes fifteen or twenty miles in length, with steep sides, varying from twenty feet to seventy feet above the general level. One is to be seen three or four miles to the west of Dublin, running from the banks of the Dodder, past the old castle of Tymon, by the Green Hills, to the valley of the Liffey.

Should any member of the British Association visiting Ireland wish to travel further, there are the collieries near Castlecomer, county Kilkenny, and Killenaule, county Tipperary, with anthracite coal and numerous fossil plants, &c., in the shales, especially in the collieries near Tipperary; the celebrated old red sandstone quarry at Kiltorcan, near Thomastown, county Waterford, with its well-preserved plant and fish remains; the promontory of Hook Head, county Wexford, where the lower shales of the carboniferous limestone are covered with a profusion of beautiful fossils, and at Sand Eel Bay, close adjoining, the junction between the Old Red Sandstone and carboniferous strata may be seen; the carboniferous limestone between Limerick and Foynes, full of good fossils; the Upper Silurian rocks of the Dingle promontory, county Kerry, more difficult of access, but containing numerous fine fossils; the cliffs of Moher, county Clare, of Coal Measure strata, upwards of nine hundred feet high, looking out upon the broad Atlantic, and the Llandovery strata of Connemara; the Silurian limestone of the Chair of Kildare, with its profusion of fossils and intrusive porphyry, like that of Lambay; the hard chalk "white limestone" of Antrim, capped by basalt, with lias and Rhœtic beds, near Belfast and Larne; and the Miocene plant beds, associated with the iron ores in the basalt, near Carrickfergus, and extending over a considerable portion of the north of Ireland.

* *Jour. Geol. Soc. of Dublin*, vol. iii. p. 280 (1848).
† *Ibid.*, vol. x. p. 103 (1863–64).

MICROSCOPY.

A Good Mounting Medium.—For some time I was at a loss to find a good medium that would fix a metallic or other ring to the glass slide, and at the same time resist the action of thin balsam, that is, balsam rendered thin by the addition of chloroform, benzine, or turpentine. I tried gold size, and allowed the slip to remain for some months to get perfectly hard before attempting to use it. This was moderately successful as far as the turpentine-balsam went, but with the chloroform and benzine it was a complete failure. Marine glue is, of course, entirely out of the question, it being so rapidly and easily dissolved by the two last-named fluids. The only medium I have found, that is thoroughly to be relied upon, is a cement known as "Thompson's Cement," which is made by Messrs. Thompson & Capper, of 4, Lord Street, Liverpool. I give the name and address, as it is important to know where it can be obtained. I have used it now for some time with the most satisfactory results. The balsam, no matter

with what it is diluted, remains clear and transpar ent. The ring can be put on the glass slip, the cell cleaned, and be ready for use in a few minutes. I strongly recommend it to the working microscopist.—*John S. Hicks, F.R.C.S.*

VOLVOX GLOBATOR.—We strongly recommend our readers to study an article in the *Popular Science Review* for July, on "Volvox Globator," written by Mr. A. W. Bennett, M.A., F.L.S. The same journal also contains a capital paper by Dr. Wallich, "On the *Radiolaria* as an order of the Protozoa."

MICROSCOPY IN AMERICA.—It is proposed to hold a Microscopical Congress in August next at Indianapolis, at which it is expected that all the leading microscopical societies in the United States and elsewhere will be represented. Perhaps this may be the means of settling many of the vexed questions with which journals devoted to microscopical research are often too full. There is every expectation of the meeting being successful, both in point of numbers, and in the character of the papers to be read.

THE EXAMINATION OF MINUTE LIVING ORGANISMS.—Mr. Dudgeon suggests that living microscopical objects might always be seen, if the objective were enclosed in a brass or other metallic tube, having its lower end closed by a piece of thin microscopic glass coming close up but not touching the object-glass. With this protection, he says, the end of the microscope may be plunged into a small tank filled with water, containing living organisms, and thus the latter may be examined at leisure.

ZOOLOGY.

THE COLOURING MATTER OF BIRDS' EGG-SHELLS.—Mr. Liebermann has recently proved that the blue or green colour of birds' eggs is due to a bile pigment which resembles biliverdin in certain respects. The shells frequently contain a second colouring matter—not a bile pigment—which exhibits a characteristic absorption spectrum.

THE MANATEE AT THE WESTMINSTER AQUARIUM.—Those who have the opportunity should lose no time in seeing the Manatee (*Manatus Americanus*) now on exhibition at the Westminster Aquarium. This very individual might have been the one which sat for its portrait in SCIENCE-GOSSIP for March, 1876, so true is the illustration. Mr. Southwell's paper of the above date will be now read with greater interest by those who visit the living example. The latter was taken at the mouth of the Essequibo, off the island of Leguan, British Guiana. It was brought on the deck of the *Blenheim* to Glasgow, where Mr. Carrington, the able naturalist of the Westminster Aquarium, purchased it, on the 1st of July last, and brought it thence to London, in a special truck. The greatest difficulty experienced in its transit by railway was in keeping up the right temperature, which is between 70° and 75°. When the temperature was lower than 70°, the Manatee would resent the reduction by raising itself bodily upright out of its tank. The powerful muscles of its enormous tail, and the extreme buoyancy of its body, would easily enable the animal to do this. It is healthy, eats about two stone weight of lettuces, cabbages watercress, zostera, ulva, &c., every day; and sleeps in what seems a most uncomfortable posture, arched like a half-bent bow, but still resting on its tail. The last of its tribe as a denizen of English waters was the *Halitherium* of the Suffolk Crags.

PLANORBIS NAUTILEUS (CRISTA).—I have been fortunate enough to find the above minute shell upon the Potamogeton in two ponds, not far from the Viaduct, Folkestone. In one the specimens were more numerous and finer than the other. It is the first time this *Planorbis* has been found in this locality (July).—*H. J. T.*

HABITS OF RAPTORIAL FLIES. — My attention being attracted by a sharp buzzing on the window, I looked, and saw two flies struggling together and rolling over. After a very few moments one of them, an *Empis* I think, flew away, leaving the other, a common house-fly, alive, and apparently little the worse. It walked about, and took a short flight, but in less than half a minute it rolled over, became convulsed, and died almost instantly after. Whether its death was due to the abstraction of the blood, or to the injection of a poison, I cannot say, but the brief attack of the rapacious fly seemed certainly more rapidly fatal than that of a moderate-sized spider.—*J. W. Slater.*

THE MICROPHONE IN NATURAL HISTORY.—Mr. S. D. Bairstow suggests the use of the microphone for the investigation of the phenomenon of stridulation in insects.

MIMICRY IN INSECTS.—At a recent meeting of the Entomological Society the photographs of two species of Orthoptera, allied to *Pterochroza illustrata* and *P. ocellata* were exhibited, in illustration of the doctrine of "mimicry." The above insects are remarkable for their perfect imitation of dead leaves, which is carried out in the neuration of the wings even to microscopic details, as compared with the ribs and veining of leaves.

MOLES AT WORK.—Professor Paley, in a late number of your periodical, says that he never met a person who could aver having seen a molehill cast up. I beg to state that moles have been at work under my eyes on two occasions. So many years have since passed, that I can only say, as to time,

that the process took place in broad day; whereas the mole usually works, I believe, at three or four o'clock in the morning. On one of the above occasions I was walking through a wood, and seeing a disturbance in the ground close to me, I watched it. A mole, in working through the ground, had come upon the root of a tree running horizontally near the surface: it did not suit the animal's convenience to burrow under, and so up he came into daylight. In another minute, however, he was into the earth again on the other side of the root.—*W. H. B. P.*

Science in the Provinces.—One noteworthy feature of modern scientific research is the spirited manner with which it is pursued in nearly every city and town of importance in the United Kingdom. Under some name or another denoting the nature of the particular sciences affected, societies, associations, and clubs, are distributed far and near. In most of them we find men whose names are widely known for scientific research, and who frequently act as nuclei around which those gather who love science in some form or another. Many of these provincial societies publish their transactions, in which we often find papers that would do honour to any learned society in London. In natural science prominence is usually and very properly given to papers dealing with the fauna and flora, geology and meteorology of the neighbourhood. The number of societies publishing some abstract or another of their work is increasing, insomuch that it has been found necessary to establish such periodicals as the "Naturalist," to record the doings of the various Yorkshire societies and clubs; the "Midland Naturalist" doing the same useful work for all societies in the Midland counties. Among other publications of this kind we have lately received, we are glad to note the establishment of another society in Manchester under the name of "The Science Association," the president of which is Mr. Thomas Harrison, F.C.S., and the secretary, Mr. A. Hutton. This association has been founded chiefly to enable working men to meet together for scientific purposes. We wish it every success! The Liverpool Naturalists' Field Club have just issued their "Proceedings" for 1877-78, containing their president's address, and well-written accounts of the excursions and evening meetings. This is one of the oldest of our field clubs, having been in existence eighteen years. It is fortunate in having for its president such a well-known and enthusiastic naturalist as the Rev. H. H. Higgins, M.A. The Goole Scientific Society have also issued their Annual Report, in which we find short, but interesting, and often valuable accounts of the summer excursions; whilst some valuable papers, such as the list of birds observed in the neighbourhood (by Mr. T. Bunker), and another, the flora of the district (by Mr. Birks), have been printed in full. The Hastings and St. Leonard's Philosophical and Historical Society have published a cheap but full and clear guide to the natural history of the vicinity, in which we find a catalogue of all the mammals, birds, reptiles, amphibians, fishes, mollusca, insecta, crustacea, &c., together with an equally accurate list of plants, phanerogamic, and cryptogamic. The Birmingham Philosophical Society have also issued their "Proceedings" for 1876-77, in which we find more abstruse papers "On the Kinetic Theory of Gases," by the Rev. H. W. Watson; "On Science as an Instrument of Higher Education," by Mr. Hookham; "On the Place of Archæology in Science," by Mr. J. Kenward, &c. We shall at all times be glad to receive copies of the papers or abstracts of meetings of any or all of our provincial societies.

The British Association Meeting at Dublin.—This annual congress of science commences its meetings at Dublin on August 14th, under the presidency of William Spottiswoode, LL.D., F.R.S. &c. The following are appointed Presidents of Sections:—*Mathematical and Physical*, the Rev. Professor Salmon, F.R.S.; *Chemical*, Professor Maxwell Simpson, F.R.S.; *Geology*, John Evans, D.C.L., F.R.S.; *Biology*, Professor W. H. Flower, F.R.S.; *Department of Zoology and Botany*, Professor Flower; *Department of Anthropology*, Professor Huxley; *Department of Anatomy and Physiology* Dr. R. Mc Donnell; *Geography*, Professor Sir Wyville Thomson; *Economics and Statistics*, Professor J. K. Ingram; *Mechanical*, E. Easton, C.E. In addition to the inaugural address there will be lectures by Mr. G. J. Romanes, F.L.S. on "Animal Intelligence," and by Professor Dewar, on "Modern Ideas of Chemical Action." An excursion committee has prepared a guide book to all the places appointed to be visited, so that every object of scientific interest may be brought before the notice of the visitors. We anticipate a great success for the Dublin meeting.

BOTANY.

Fertilization of Ophrys muscifera.—H. Müller has communicated to *Nature* some new facts in connection with the hitherto mysterious fertilization of this plant. In sunny weather, and under normal conditions, the labellum secretes fluid, and a broad, central, longitudinal stripe of its surface is covered with small drops. Of 50 fresh flowers, Mr. Müller found the labellum in 13 covered with such drops; in 25, shining adhering moisture; and in 12 without any conspicuous trace of fluid. The two small shining projections on each side of the base of the labellum were quite dry in all the flowers. In one flower he saw a fly (*Sarcophaga*) sitting on the labellum, and licking the drops. Its head was directed towards the base of the labellum. On Mr. Müller's

approaching, it flew away before having reached the sham-nectaries, and the flower visited by it was found without pollen on the stigmas, and with both pollinia in their cells. Mr. Müller thinks it probable that this fly, if it had not been disturbed by his approach, would have stepped forward on the labellum, and, trying one of the sham nectaries, would have removed one of the pollinia, and perhaps have transferred it to the stigma of another plant.

BOTANICAL NOTES FROM THE ISLE OF WIGHT.—Some of your readers may be interested in the following botanical notes on specimens obtained in the Isle of Wight early in June. Taking Ventnor as a starting-point, there are a great number of plants to be found, either by rambling through the beautiful landslip between Bonchurch and Luccombe Chine to the Shanklin Copse, or by ascending the steep sides of St. Boniface Down through the Rew Wood, and returning to Ventnor by St. Lawrence and the cliff. In either case, by walking about five miles, the diligent collector will be rewarded with a great variety of flowers—some necessarily common, others of rare occurrence. In the more shaded parts of the landslip I obtained specimens of *Epipactis latifolia*, or broad-leaved Helleborine; *Listera ovata* (Twayblade); *Ophrys apifera* (Bee Orchis); *Orchis maculata* (Spotted Orchis); *Orchis latifolia* (Marsh Orchis); also, half-withered *mascula* (early Purple Orchis); the *Iris fœtidissima*, or Purple Iris; *Chlora perfoliata* (Perfoliate yellow-wort); *Hypericum perforatum* (St. John's Wort); *Anthyllis vulneraria; Lathyrus pratensis; Hippocrepis comosa; Lotus corniculatus; Lychnis Flos-cuculi; L. diurna; L. vespertina; Silene inflata; Geum urbanum; Anagallis arvensis, Lysimachia nemorum; Ononis arvensis; Tamus communis; Galium cruciatum; Scrophularia nodosa; Geraniums* (3), *Veronicas* (2), *Myosotis* (2); *Epilobium palustre.* These were the plants actually in flower, but I observed many just in bud, or, on the other hand, already faded; among the latter the Garlic had evidently been out in profusion near Luccombe. On the Ivy the parasitical *Orobanche major* (Greater Broom Rape) is found in great quantities; and altogether, during a hurried search, I collected thirty-two different species between Ventnor and Luccombe Chine. From Luccombe Chine a footpath leads over a couple of fields across the Shanklin road to the copses beyond, here I found *Asperula odorata* (Sweet Woodruff); *Tragopogon pratensis* (Goat's-beard); *Cornus sanguinea* (Dogwood); *Salvia verbenaca* (Wild Sage); *Reseda Luteola* (Dyer's Rocket); *Tormentilla officinalis* (Tormentil); *Fragaria vesca* (Strawberry); *Linum perenne* (Flax), growing in the fields; *Euphorbia amygdaloides* (Spurge); *Cynoglossum officinale* (Hound's-tongue); *Rhinanthus Crista-galli* (Yellow Rattle); *Pedicularis palustris* (Dwarf Red Rattle); *Lonicera Periclymenum* (Woodbine); *Ligustrum vulgare* (Privet), and other common plants. Returning to Ventnor over the downs, I found *Gentiana campestris* in abundance; *Polygala vulgaris*, or Milkwort, red, blue, and white; *Gymnadenia conopsea*, or Sweet-scented Orchis; *R. spinosissima*, and the Sweet-briar; *Helianthemum vulgaris*, or Rock Rose; *Onobrychis sativa* (Saintfoin); *Thymus Serpyllum* (Thyme); also masses of handsome Foxglove. Starting in the opposite direction, walking through the Rew Wood, I obtained *Ophrys muscifera* after careful search, but almost faded; possibly three weeks earlier it might be found more easily. The *Habenaria bifolia* (Butterfly Orchis) is plentiful in this wood; *Melampyrum pratense* is common enough; also further on towards St. Lawrence the peculiar *Melampyrum arvense*, or purple Cow-wheat, which is almost confined to the Isle of Wight; *Hypericum pulchrum* also I found here. At St. Lawrence grows *Cotyledon umbilicus;* the rare *Matthiola incana* (or Wild Stock); *Armeria maritima* (Thrift); the rare *Silene noctiflora* (Night-flowering Catchfly); *Jasione montana; Humulus Lupulus.* Other flowers I have not given the names of; but, altogether, in two mornings' ramblings I collected over eighty different species. Going somewhat further from Ventnor the Sundew, Asphodel, Bog Myrtle, Bog Bean, and other interesting plants are to be found.—*C. Parkinson.*

CHEMICAL IMITATIONS OF VEGETABLE DYES.—In 1868 the manufacture of alizarine from coal-tar refuse was discovered, and thus the madder-dye was artificially imitated, and quite a new industry sprung up. No other vegetable dyes have been chemically imitated, until a few weeks ago, when synthetic chemistry obtained another great triumph, in the production of dyes identical with those of the Indigo plant (*Isatis tinctoria*). The discovery is due to Professor A. Baeyer, the successor at Munich to Baron Liebig. The name of *Indigotine* has been given to this new dye.

ARUM ITALICUM.—This plant has only been recorded from the Isle of Wight, and most of the specimens distributed have been cultivated ones. My attention was drawn to an arum growing near Penzance, by Dr. Ralfs, which he believed was *A. italicum.* It was the first living specimen I had seen, and I found it was the same form I had noticed near Helston, in Penrose Wood, where it grows in considerable quantity. I had put it down as a variety of the common form. I have tried to dry a few specimens but they are most troublesome.—*James Curnoch, Helston.*

NEW CHESHIRE LOCALITIES FOR RARE BRITISH PLANTS.—*Ophrys apifera*, Sandiway, Mid Cheshire. *Geranium pyrenaicum*, by the roadside, Hartford. *Corydalis solida*, Sutton-by-Aston. *Vinca minor*, Roadside, Over. *Viola Reichenbachiana*, Crowton. *Scrophularia vernalis*, Weaver Valley. *Cystopteris*

fragilis, near Over. *Euonymus europæus*, Weaver Valley. *Rhamnus catharticus*, Newton-by-Frodsham. —*James F. Robinson, Frodsham.*

A Glass-eating Lichen.—In reply to Mr. G. S. Boulger, if he carefully looks at my paper he will see that I have mentioned the conditions under which the objects were seen by a Hartnach microscope. If he will refer to Sanderson, Klein, Foster, and Brunton's "Handbook to the Physiological Laboratory," and many other works, he will see the magnifying power is thus expressed:—Fig. A is, I believe, about 450, fig. B about 200, and fig. D about 2 diameters, fig. E being natural size. They were drawn from the growth as it was placed, glass and all, under the microscope without re-agents. The drawings were by the camera lucida and in pencil. The reasons why I concluded that these growths destroyed the glass were these:—1. When they occupy a hole, it is entirely filled by it, no more, no less. 2. The growing processes always fill the radiating furrows. 3. The cellular structure is embossed on the glass. 4. No other explanation is admissible of the formation of the holes. 5. The impressions become confluent, as all areas do where growth commences at different points and continues from the margins. 6. It is known that calcareous, and even silicious rocks, are eroded by the larger varieties of lichens growing on them, as he may observe for himself.—*H. J. Johnston-Lavis.*

Carex Buxbaumii (Wahl.)—This rare plant, which is confined, according to the "Cybele Hibernica," to a very limited station in Lough Neagh, near Toombridge, Co. Derry, had not been seen for many years up to the present one. The last record of its existence occurs in Science-Gossip for July 1st, 1867, in a note communicated by my friend Mr. S. A. Stewart, of Belfast, where we are informed that "two flowering stems were taken away." Although diligently looked for several years subsequently, no trace could be seen of the plant; and in the "Guide to Belfast," published by the Belfast Naturalists' Field Club, on the occasion of the British Association meeting in 1874, we find a fear expressed that it had become extinct. The winter of this year proved a very wet one, and the waters of Lough Neagh consequently rose far above their usual level. This circumstance decided me to go and search for the Carex, and endeavour to ascertain whether it still existed, or had become one of the "lost plants" of the British Flora. Several hours careful search, in which I went over the ground almost by inches, resulted, however, to my extreme delight, in the discovery of a fine tuft of the Carex adorned with a number of flowering stems. Of these I removed a few, but I left untouched the tuft of perennial roots which appeared in a very healthy condition. This is the fourth occasion on which the plant has been gathered, since its discovery in 1835 by Dr. David Moore, of Glasnevin, and its scarcity appears to be accounted for by the fact, that in dry seasons the plant may not flower, and as it is only in very small quantity would consequently escape observation.—*Thos. H. Corry, Belfast.*

Drying Plants.—Mr. Buck's excellent article, "How to make an Herbarium," has touched on a subject of great importance to the "Science-Gossip Exchange Club," that of mould in plants which have not been made *completely dry.* How many sighs would be saved to those who, having mounted apparently lovely specimens, find them, a few months after, enshrined in microscopic fungi? If a little longer pressing had been given them this would not have been the case. May I be excused for this appeal to collectors.—*F.H.A.*

GEOLOGY.

The Geology of Well Sections.—At a recent meeting of the Geological Society, Prof. Prestwich read a paper "on the Section of Messrs. Meux & Co.'s Artesian Well in the Tottenham Court-road, with notices of the well at Crossness, and another at Shoreham, Kent; and on the probable range of the Lower Greensand and Palæozoic Rocks under London." The well-known boring at Kentish Town in 1856 showed the absence at that point of Lower Greensand, the Gault being immediately succeeded by hard red and variegated sandstones and clays, the age of which was at first doubtful, but which were finally considered by the author to approach most nearly to the Old Red Sandstone near Frome, and to the Devonian sandstones and marls near Mons, in Belgium. The existence of some doubt as to this identification rendered the boring lately made at Messrs. Meux's brewery particularly interesting, and the method of working adopted by the Diamond-boring Company, by bringing up sharply cut cores from known depths, gave special certainty to the results obtained. The boring passed through 652½ feet of Chalk, 28 feet of Upper Greensand, and 160 feet of Gault, at the base of which was a seam, 3 or 4 feet thick, of phosphatic nodules and quartzite pebbles. Beneath this was a sandy calcareous stratum of a light ash-colour, passing into a pale or white limestone, and this into a rock of oolitic aspect. Casts and impressions of shells found in this bed showed it to be the Lower Greensand, whose place it occupied. The boring was carried further in the hope of reaching the loose water-bearing sands of this formation, but the rock became very argillaceous, and, when 62 feet of it had been passed through, the boring entered into mottled red, purple, and greenish shales, dipping at 35° in an unascertained direction. These beds continued through a depth of 80 feet,

when, their nature being clearly ascertained, the boring was stopped. The fossils of these coloured beds, which included *Spirifera disjuncta*, *Rhynchonella cuboides*, and species of *Edmondia*, *Chonetes*, and *Orthis*, show them to be of Devonian age. Thus, the existence of Palæozoic rocks at an accessible depth under London, and the absence of the Jurassic series, as maintained long since by Mr. Goodwin-Austen, is experimentally demonstrated. These facts are of interest in connexion with the question of the possible extension of the coal-measures under the Cretaceous and Tertiary strata of the south-east of England. The beds found at the bottom of Messrs. Meux's boring are of the same character as the Devonian strata which everywhere accompany the coal-measures in Belgium and the north of France, being brought into juxtaposition with them by great faults and flexures. The author refers especially to a remarkable section at Auchy-au-Bois, in the western extremity of the Valenciennes coal-field, which is particularly interesting from its furnishing evidence that the Hardinghen coal-field, between Calais and Boulogne, is a prolongation of that of Valenciennes, and because the same strike and a prolongation of the same great fault observed at Auchy-au-Bois through Hardinghen would carry the southern boundary of any coal-field in the south-east of England just south of Maidstone, thence passing a little north of London. Hence it is in the district north of London that there is most probability of the discovery of the Carboniferous strata. The extent of country in which shafts could be sunk to the Palæozoic strata will, however, be limited by the presence of the water-bearing Lower Greensand, which probably reaches close to London in the south, reappears in Buckinghamshire and Bedfordshire, 30 or 40 miles north of London, and probably extends some distance towards the city under the chalk hills of those counties and Hertfordshire. The nature of the representative of the Lower Greensand in the boring, and the character of the fossils contained in it, lead the author to the conclusion that in it we have a deposit produced near the shore of the Neocomian sea, here probably consisting of cliffs of Devonian (or Carboniferous) rock. From these cliffs the calcareous material which here replaces the usual loose sands of the Lower Greensand was perhaps derived by the agency of springs; and the shore-line itself must be situated between the south end of Tottenham Court-road and the Kentish Town boring. The sandy beds of the Lower Greensand will probably be found to set in at no great distance to the southward, presenting the conditions necessary for storing and transmitting underground waters. A test boring made by Mr. H. Bingham Mildmay at Shoreham-place, about 5 miles from Sevenoaks, and in which the Lower Greensand was met with at about the estimated depth (450 feet) and furnished a supply of water, seems to confirm these views. At the close of Prof. Prestwich's paper, Mr. Charles Moore, F.G.S., remarked that the various deep well-borings around London have abundantly proved the correctness of Mr. Godwin-Austen's inference that the Palæozoic axis of the Mendips is continued beneath the Secondary rocks of the south-eastern counties. Mr. Moore has himself shown that where these Palæozoic rocks finally disappear under the Secondary strata, there are found at the unconformable junction of the two formations a set of deposits indicating the existence of very peculiar physical conditions, and containing an admixture of fossils from very different geological horizons. Hence he was led to inquire whether any trace of similar abnormal deposits might be found in the deep well-borings of London. With this view he set to work at washing some of the materials supplied to him from Meux's well, and studying the minute and often microscopic organisms thus obtained. The Chalk was not particularly examined; but from a single small sample of Upper Greensand he obtained numerous Foraminifera and Entomostraca, including one Cyprid new to science. The Gault yielded 16 genera and over 30 species of Foraminifera, and 20 species of Entomostraca, 4 of which are new, together with many young forms of Gasteropods and Cephalopods. But the chief interest of Mr. Moore's investigations centres in the 67 feet of strata intervening between the Gault and Devonian. In this marly and oolitic-looking deposit he found no less than 85 different kinds of organisms, exhibiting a singular admixture of marine and lacustrine forms of life. Foraminifera are rare, but Entomostraca and Polyzoa are very abundant. Some genera are found, such as *Carpenteria*, *Saccammina*, *Thecidium*, and *Zellania*, of which the range in time is greatly extended by these investigations. The author fully confirms Mr. Etheridge's reference of the beds in question to the Neocomian period, widely as they differ in physical characters from the Lower Greensand strata of the south-east of England. From a careful study of the nature and condition of preservation of the minute organisms, he concludes that the deposits which contain them were formed at first in shallow lacustrine hollows on the surface of the Devonian rocks now lying buried at a depth of 1,000 feet below London, and that these lakes were invaded by the waters of the Neocomian sea, with the deposits of which their sediments were in part mingled, and under which they were finally buried. Prof. Ramsay said that as the South Wales coal-field, the Bristol coal-field, and the Forest of Dean coal-field were basins originally continuous, and only separated by denudation, Mr. Prestwich and himself had agreed before the Royal Coal Commission that coal-fields might exist below the Secondary strata to the eastward. The correctness of this opinion was proved by the boring put down by Mr. Fox at Burford, in Oxfordshire, which reached undoubted Coal-measures. Prof. Ramsay thought that one of these coal-fields might yet be found near London by penetrating the

overlying Secondary rocks. Mr. W. Whitaker, F.G.S., remarked on the difference between the Lower Greensand at the outcrops north and south of London, and the peculiar oolitic limestone found in Meux's well. He regarded the beds at the bottom of the Crossness boring as by no means proved to be Devonian; but thought some of the specimens more closely resembled New Red Marl. He referred to the Loughton section, in which water was got at the base of the Gault, probably indicating the existence of Lower Greensand. He thought that, considering the inverted condition of corresponding strata in France and Belgium, the determination of the direction of the dip of the beds in Meux's well was by no means of great importance. He did not think that the depth of Gault at Shoreham was exceptional, as at Caterham and other points along the outcrop an even greater thickness of Gault had been found. He stated that the Cambridge phosphate-bed, a few inches thick, was found immediately above the Upper Greensand in Meux's well, and pointed out that some doubt existed as to the thickness of the several beds passed through in the boring.

A Fossil Bird.—Mr. J. A. Allen has just obtained a new genus and species of fossil Passerine bird from the insect-bearing shales of Florissant, Colorado, which shows the greater part of the skeleton, and the impressions of the feathers. The general features indicate arboreal habits, and well developed power of flight. The name of *Palæospiza bella* has been given to this interesting Tertiary fossil.

A new Fossil Mammal from the Oolitic Formation of America.—The right lower jaw of a small mammal has just been found in the Rocky Mountain regions. Its position was in the Upper Oolitic or Jurassic rocks, where it was found associated with the remains of *Dinosauria*. The name of *Dryolestes priscus* has been given to this newly-discovered mammal, which bears out the evidence of early mammalian life elsewhere by its being marsupial, and allied to the existing opossums. The size of this primitive animal was about that of a weasel. No fossil mammals have previously been discovered in the Oolitic rocks of America.

NOTES AND QUERIES.

Remarkable Nests.—Having noticed two short articles on "Remarkable Nests" in the Notes and Queries, I thought it might not be out of place to add one other which came under my notice this year. While out for a walk late in March, I saw two blackbirds and one thrush fly out of a hawthorn-bush. On looking into it, I found a true blackbird's nest, built of old hay, with a lining of mud, and then relined with hay, &c., again; but, curious to say, it contained three eggs of the thrush; there were no signs of their being crossed. I am sorry to say that I have not since had the opportunity of visiting the nest, else I might have been able to account for it in some way or other.—*Joseph T. Gumersall.*

How did they get there?—On the 17th of June, 1877, I put a few bits of straw into a bottle of water, placed it in the sun, left it there for some time, and had a large quantity of the infusoria. After I had finished with the infusion, I put it into a dark cupboard; it was left there for about seven months, when, wanting some wide-mouthed bottles, I filled this up with water, and left it for a day or two, and when I came I found it swarming with the water-flea. If any of your readers can give me any light on the subject, I should be much obliged.—*E. W. Wilton.*

Ornithological Nomenclature. — My little boy is beginning to study ornithology, and I have warned him to be very careful that, in his scientific terms, to make his adjectives agree with nouns, &c. In the first week of his study he brings me Morris with *Erythaca rubecula*, and Wood with *Erythacus rubecula*, and asks me to explain. I cannot. Will some correspondent kindly do this for my little boy? —*Robin Goodfellow.*

Strange Suicide. — The following account appears in a Bedford paper as occurring at Wootton: —A cat belonging to the Vicar of this parish had given birth to four kittens. As she did not seem strong enough to suckle so many it was judged best to drown them. After this she moped and went about in quite a desponding manner. On Thursday, June 20, she seemed worse, in fact half frantic, continually rushing about the house. On a sudden she dashed out of the house, ran across the lawn and plunged into the ornamental pond in front of the house. She was quickly rescued, and a little brandy given her. As she then seemed a little better she was let loose. Later in the afternoon, however, she spied an opportunity to get out of the house, ran again to the pond, and plunging in was drowned before she could again be recovered.

Moles at Work. —In Professor Paley's paper on Earthworms in last month's Science-Gossip this passage occurs: "This is the case with mole-heaps; but I never saw and I never met with any one who could say he had seen the earth actually being thrown up." If the professor is here speaking of moles, surely he knows but little about them, almost every professional mole-catcher carries a spud with which to pounce on any luckless mole seen throwing up the earth. I myself, one day last month, observing a perfectly fresh mole-run, followed it up, and soon had the satisfaction of seeing the earth being thrown up, evidently by a mole; after watching this proceeding for some seconds, I put my heel hard down behind the mole, thereby cutting off his retreat, and dug him out with my walking-stick. Within a quarter of an hour in the same field I served another mole the same. A third, which I saw actively employed in digging, heard me coming and had time to retreat before my foot barred his tunnel. I may mention that the field had been that day sown with turnips and rolled down, so that the moles, as is their custom, were not throwing up what are commonly known as mole-casts, but simply burrowing about 3 inches under ground and forcing up the soil as they proceeded. From this and other evidence I am strongly of opinion that the intelligence of the mole is by many naturalists over-rated; it is by far the easiest animal I know anything about to trap, and although if it does hear you coming it undoubtedly runs

away, yet I think you may very often of a mild summer's evening catch live moles in the way I got mine as narrated above.—*James Crouch.*

CHEAP AQUARIA.—I am glad to hear of your Chicago correspondent's "Carboy;" because it must form an excellent, cheap, serviceable, dark, non-corrosive aquarium, for workshop, schoolroom, or places where appearance is not essential; and must serve well as a supplementary reserve tank or hospital; but is not a carboy unsightly for drawing or sitting-rooms? For small, simple, movable aquaria, I know nothing better than shallow glasses, commercially known as "pastry pans," or "anemone pans." They are made from 6 in. to 24 in. in diameter, varying in depth from 4 in. to 12 in., costing about 6s. 6d. for one 22 in. by 10 in. I must take exception to "H. G. Atwood's" "tinfoil binding" (SCIENCE-GOSSIP, p. 167, July, 1878), because metals of all sorts, or any corrosive material are bad for aquaria. Therefore slate tanks are preferable to iron ones, and vulcanite pipes are found best for circulating pipes, stop-cocks, &c., because rust is thus avoided, and the material strong and durable. "Obedience to the laws of service" is of primary importance in aquaria.—*G. S.*

RANUNCULUS ARVENSIS.—The carpels of *Ranunculus arvensis*, which are covered on both sides with conical, straight, or hooked prickles, probably gave rise to the appellation "Devil's claws," one of the common names of this species of Ranunculus.—*Ada P.*

ROBINS' EGGS.—It may interest your correspondent, Mr. C. A. Haden, to know that I have taken, or noticed, many clutches of white eggs of robin. This season, I had brought to me six eggs, white, and considerably larger than the ordinary robin's egg, with a query as to what they were, and at once pronounced them to be robins'. I have often had them brought to me by lads as cuckoo's eggs.—*R. Standen, Goosnargh, Lancashire.*

BIRDS SINGING AT MIDNIGHT.—The date given in the April number of SCIENCE-GOSSIP is a misprint. I heard the vocal concert on the night of Saturday, the 16th of February, and two following evenings. I had not observed the error until it was pointed out to me by a friend, and purposed correcting it in the next issue.—*R. Standen, Goosnargh, Lancashire.*

THE CUCKOO AT NIGHT.—Early last June, I often heard the cuckoo singing between eleven p.m. and midnight, once as late as eleven fifty, but I never heard his voice in the "small hours," as Mr. A. M. McA. appears to have done.—*J. W. Slater.*

VARIETIES OF THE CAMBERWELL BEAUTY.—In Central to Eastern Europe, this butterfly, which is amazingly common, and always turns up when you want something better, has a decidedly yellow border. In old-flown specimens, the margin is sometimes faded down to a white.—*J. W. Slater.*

FASTING PARASITES.—A friend gave me some living parasites of Capercailzie (*Tetrao urogallus*), about seven months ago. I put some in a box, and left them undisturbed till last week, when upon opening the box, I was much surprised to find two were still alive! What can they have lived upon?—*A. A. G. A.*

ORIGIN OF "COLIAS."—In answer to your correspondent's (Haviland) query, respecting *Colias edusa*, I transcribe from the "accentuated list of the British Lepidoptera," published some years back by Van Voorst, the following at p. 2. "*Colias*, a surname of Venus, from a promontory of Attica, where she was worshipped." "*Edusa*, a Roman divinity worshipped as the protectress of children, and supposed to bless their food (*edere*, to eat.)" I think the above derivation of *Colias*, a more satisfactory, and, at least, a more pleasing one than the one he gives.—*W. Hambrough.*

"GREEN HASTINGS"!—A day or two since I heard the cry, "Green Hastings"! which I do not remember having heard for some years. When a boy, fifty years ago, it was the usual cry for green peas. Perhaps some readers of SCIENCE-GOSSIP can give the origin of the cry, "Green Hastings"!—*W. S. S.*

FLEAS IN COUNTRY QUARTERS. — I wish to mention what seems to me to be a somewhat unusual occurrence. Two members of my family and myself were walking out in the country on the 10th inst., and after having travelled some miles, feeling tired, we seated ourselves upon some trees, in a meadow, which had evidently been cut down some time, as they presented a very bleached appearance. Shortly after we had reached home we made the unpleasant discovery that we had become victims to the attacks of the common flea (*Pulex irritans*), and it was with much difficulty that we were able to rid ourselves of such troublesome and unwelcome pests. There is no doubt in my mind that the insects were occupants of the trees upon which we rested; but the question arises, how they came there. Probably some of the contributors of SCIENCE-GOSSIP could throw some light upon the circumstance, which, to say the least, is a rather peculiar one.—*W. W. Ingall.*

DEVELOPMENT OF FROG'S SPAWN.—One of your contributors on this subject finds a difference of results with regard to the same period of time to those of another observer. I think that *temperature* has a great influence on the speed of development; for I gave some frog's spawn to a friend in order that we might observe together; it was from one agglomeration of ova that both the observed batches were taken. He placed his in a warm room, exposed in a window facing south, while I placed mine in a large cold room, facing north-west. His had developed into active tadpoles before mine had altered much, and after this stage his still progressed far quicker than mine, so much quicker, in fact, that I concluded that the rate of development could be very materially altered by temperature.

MUSTARD.—In the article on mustard (p. 36) it is stated that some authors derive *sinapis* from *sino*, to hurt, and *opis*, the eyes. It would be difficult to find an idea more absurd than this, even amongst the wildest vagaries in which etymologists have run rampant. In the first place the *i* in *sinapis* is short, and the *i* in *sino* (or rather *sinomai*) is long; then there is no such word as *opis* meaning eyes (in Greek), and though there is one something like it, which might by a stretch bear that meaning, the *s* is an essential part of that word, and not, like the *s* at the end of *sinapis*, a mere accident. For older forms of the word are *sinapi*, *sinapu*, and *napu*. We may not be able to say how the *si* came to be prefixed, but it is certain that the origin of all these words must be sought in connection with the Celtic and Gaelic root, which the author mentions in the next sentence. For those on the look-out for *primâ facie* derivations, there is one suggested by Mr. Glasspoole's paper, so obvious that it is strange he did not hit upon it, as others have done. Why should not the name of

mustard be derived from *mustum ardens*, in the preparation of which it was used? Suspicious as it may seem at first sight, on deeper examination more will be found in favour of this source than of any other that has been proposed. At any rate, as the slightest acquaintance with etymological principles will show, that furnished by Mr. Glasspoole's pretty anecdote may be despatched to the limbo of all mere prettiness in science—oblivion. For it is subject to two cardinal objections: first, it does not account for the *s* which originally formed part of the word (compare Old Fr. *moustarde*, It. *mostarda*, Sp. *mostaza*); secondly, it commits the serious error of attempting to account for the French name merely as a French word, without reference to the cognate forms in other languages, all of which must have had a common origin. These remarks, though rather different from the ordinary contents of this journal, are not out of place. For there is a *science* of language. The days are past, when it could be said that in etymology "the vowels meant nothing, and the consonants very little," and, if the subject is to be entered into at all here, something more is wanted than merely to copy derivations out of old books.—*W. B. Grove, B.A.*

DESTRUCTION OF INSECTS, &c.—In the February number of SCIENCE-GOSSIP, your correspondent "L. W. G." protests against the robbing of birds' nests; in which protest I certainly join. May I be allowed, in your columns, to protest also against the wholesale massacre of insects? In the same number I read an account of a visit to Sponsa's head-quarters, and there I find that the writer pleads guilty to destroying no less than 70 of those moths, while he succeeds in taking 80 specimens of Quercus. Moreover, he meets with a brother collector who has taken 120 of the former insect in three nights, and usually takes from 12 to 20 per night. "Some gentlemen 'uv took fourty a noight this season," he is informed by another. May I ask such collectors where this is to end; for surely Sponsa is no Colorado beetle to be stamped out! Is science promoted in any way by wholesale destruction? The system of exchange is pleaded as a reason, or rather an excuse, for obtaining duplicate specimens; but the zealous entomologist should aim at something higher than becoming a mere collector, I had almost said destroyer, of insects. In the life of the Scotch naturalist, Thomas Edward, by Smiles, at page 93, I read, "He sometimes lost for a time the object of which he was in search, because he wished to observe its traits and habits. For this purpose he would observe long and carefully before obtaining possession of it. By this means he was enabled to secure an amount of information in natural history, such as no book, except the book of Nature, could have supplied him with."—H. L. G.

SEA ANEMONES.—I have kept sea anemones for the last four years with a tolerable amount of success, and have tried various sorts of food for them; such as raw meat, fish, cockles (*Cardum edule*), and mussels (*Mytilus edulis*); but find the last-mentioned agree best with them, as they seldom reject any portion after feeding, which I have found they constantly do after they have partaken of meat, &c. I give them pieces varying from the size of a sparrow-shot to a pea, according to the size of the anemone, every fifth or sixth day. Care must be taken to remove any rejecta or pieces they do not happen to eat, or they will soon decompose, and render the water fœtid and thick. I may mention that by attending to this rule, the water in my tank, holding about fourteen gallons, is as clear as crystal, although it has been over a year in use. Referring to my friend Mr. Edward Horsnaill's note on *Sagartia sphyrodeta* (page 16 of the current volume), it may interest some of your readers to know that I have had three specimens of *Corynactis*, variety *Corallina*, undergo spontaneous fission in manner described by Mr. H., and both the parent and offspring are alive and doing well (I had the original specimens from Torquay early last year, since which they have grown considerably). I think this will assist in confirming the opinion expressed by Mr. P. H. Gosse, in his "British Sea Anemones," page 291, as to the increase of this species. I may also observe that I have succeeded in rearing several anemones born in the tank, principally *Bunodes gemmacea*, and they are now, when distended, nearly an inch high, and the disc more than an inch in diameter.—*C. A. Grimes.*

"BUTTERCUP.—*Bous*, cow; *turos*, curd (Greek). Butter is therefore 'cow-curd'; in early times curd was also obtained from goats and other animals."

"TULIP, from the Persian *tulipan*, a turban."

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS. — As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

C. W. BURGESS.—Your sea-weeds are too minute and obscure to tell with any degree of certainty.

J. W. J.—The plants you sent us from Shanklin contain fossil sponges. That polished is a *Scyphonia*; the other (No. 8) contains a *Ventriculite*. See Taylor's "Geological Stories," page 180, *et seq.* Price 4s. Published by Hardwicke & Bogue, 192, Piccadilly.

DR. R. B.—It is a *Puccinia*, very much like *Puccinia Thesii*. Is it quite certain that the foster-plant is *Lythrum*?—M. M. C.

J. K. (London).—It is the *Cerastium tetrandrum*, although scarcely distinguishable from some specimens of *C. semidecandrum*.

META V.—Your plants are as follows: 1. *Cerastium triviale*. 2. Doubtful. 3. *Chrysanthemum leucanthemum*. 4. *Equisetum arvense*. 5. *Lotus corniculatus*. 6. *Geranium molle*. 7. *Erica cinerea*. 8. *Luzula congesta*. 9. *Geranium pusillum*. 10. *Malva rotundifolia*. 11. *Polygala vulgaris*. The one marked 2. is too imperfect for identification.

META. V.—We should advise you to procure a small book published by Hardwicke & Bogue, "Notes on Collecting Natural History Objects, &c." Price 3s. 6d. This would give you the information desired.

"AN AMATEUR" (Bristol).—You would find Backhouse & Son, York, the best nurserymen. No doubt you could purchase a living plant of *Dionæa* (Venus's Fly-trap).

S. E. L. (Penrith).—An excellent specimen of *Nephrodium Fœnisecii*—or *Lastrea Fœnisecii*, Lowe. It is very uncommon.

J. H. M. (London).—You might have been much wider from the mark. It is *Sagina procumbens*, L.

A. B. M.—The plants enclosed are as follows: — No. 1, Goosegrass (*Galium Aparine*, L.); No. 2, Herb-Robert (*Geranium Robertianum*, L.); No. 3, a Moss (*Polytrichum commune*); No. 4, also a Moss (*Hypnum rutabulum*); No. 5, Creeping Cinquefoil (*Potentilla reptans*); No. 6, *Galium saxatile*.

MR. BUCK sends us a plant gathered on the banks of the Orwell last August, and thinks it is *Lolium temulentum*. It is a much commoner species, namely, *Triticum repens*, var. *littoreum*, Schum., or the *T. littorale*, Host, a species according to continental authorities.

A SUBSCRIBER.—Cow's horn may be easily softened and even dissolved in a strong alkaline solution, such as strong soda-lye.

W. HAMBOROUGH.—"The strange little stalked things" are the eggs of the Lace-wing Fly (*Chrysopa vulgaris*), belonging to the Neuroptera.

W. C. C. — Botanical drying-paper may be obtained at Messrs. Spicer's, New Bridge-street, Blackfriars, London.

T. S. S. (Rochdale).—Your plants are: No. 1, Thyme-leaved Speedwell (*Veronica serpyllifolia*). No. 2, Heath Bedstraw (*Galium saxatile*)

C. H. G. (Clifton, Bristol).—Thanks for the specimen of Geranium; it is very interesting, and we trust you will again send anything of the kind.

W. Hamborough.—We are thankful for the Japan honeysuckle, having never before observed it in flower; your locality must suit it well.

G. S. (Knison, Wimborne).—It is without doubt the variable *Veronica agrestis*: your description at once shows it is not *polita*. It differs very much in habit, &c.

J. C. (Helston).—Thanks for your interesting notes on Scilly Isles; we are unable to state the condition of the bean-leaf. The leaf of elder has been noticed very similarly affected this season. We will try to trace reason, then will write to you.

M. S. (Brentford End).—Although we speak with some uncertainty, yet we should name it *Medicago scutellata*. Could you allow us to look at the pod? This would settle the difficulty.

R. W. (Westward).—It is *Thalictrum montanum*, Wall, and *R. Bachii*. The latter is very imperfect, and thus difficult to determine; but it is evidently a good variety of *fluitans*—possibly a new form.

M. J. Wilde.—The stone you enclosed was a fragment of *Basalt*. One of the best books on Conchology is Woodward's "Recent and Fossil Shells," published by Lockwood & Co.

J. P. G.—See an account of the Origin and Spread of the Potato Disease, in the vol. of Science-Gossip for 1873. It begins with the leaf.

B. K.—You had best obtain "Botanical Labels," by J. Robson, arranged according to the London Catalogue, and printed (on one side only, for labels) by Hardwicke & Bogue, 192, Piccadilly, at 4s. 6d.

John Hazard.—Your cardboard-box reached us in an utterly smashed condition, and it is a matter for curious speculation as to where the caterpillars are!

T. W. B.—No. 1 is not like any diatom we have seen, and we should say it does not belong to that order. No. 2 is *Eunotia diadema*, a form not uncommon in the American subpeat deposits and subalpine gatherings from all parts of the world. The species are, according to Ehrenberg, distinguished by the number of crenations, thus: *diodon, triodon, tetraodon, diadema*, &c. The largest number of teeth we have seen is 24. Pritchard (Kalfs) unites them all, and names them *E. robusta*. No. 2 is perhaps *Gomphonema coronatum*; 4, 5, 6, 7, are either sponge spicula or fragments of *Radiolarians*.

EXCHANGES.

Wanted, in exchange for 5-in. bevelled Insect-board, bevelled boards under 2½ in.—W. H. Cheesman, Coolinge, Folkestone.

For either *Nitella translucens*, showing rotation of sap, *Batrachospermum moniliforme* or *Chara aspera*, send well-mounted Slide, or any of the following:—*Cristatella mucedo, Plumatella repens, Hydra fusca, Ophrydium versatile*, to M. H. Robson, 7, Clayton-street East, Newcastle-upon-Tyne.

Side-blown Eggs for exchange,—Golden Plover, Ring Plover, Sandpiper, Curlew, Dunlin, Red-shank, Oyster-catcher, Tern, Grey Wagtail, and others. — J. Lancaster, 24, Prince's-street, Carlisle.

An Injection Syringe and twelve parts of Science-Gossip for 1874, for well-mounted Slides, or offers.—A. Alletsee, 11, Foley-street, London, W.

Will exchange Fossils (including sponge from the chalk) for British Birds' Eggs or Lepidoptera.—J. Wrangham, 93, Tyrwhitt-road, London, S.E.

Will give Parasite of Crow, or other insect preparations, mounted in balsam, in exchange for Diatoms, or Insect Eggs, mounted opaque.—J. Horn, 5, Belle-Vue-square, Scarboro'.

London Catalogue, 7th edition. Nos. 41 and 1620 given in exchange for 44, 280, 346, 455, 392, 395, 495, 496, 484, 557, 615, 613, 626, 627, 676, 682, 683, 692, 706, 709, 749, 767, 768, 772, 826, 844, 851, 855, 895, 933, 1649, 1659, 1664, 1665.—A. Wheldon, 8, Albion-street, Darlington.

Wanted, autographs of celebrated English or Continental scientists, or letters. No signatures only, but letters, essays, treatises, or writings of interest. Particularly wanted, letters, &c., of J. J. Audubon the ornithologist. In exchange small specimens of our beautiful *Emys picta*, a turtle very suitable for Aquaria, or some of our native moths, or anything procurable by a collector here. For anatomists could procure *Necturus lateralis*, our representative of the Mexican Axolotl.—Address, Chas. Mann, 44, Lake-street, Chicago, Ill.

Send object of interest, with stamped addressed envelope, for packet of Foraminfera from sponge sand, to E. W. Wilton, 1, Northfield-villas, Leeds.

A few Silkworms (will soon spin) for other objects of interest, shells, fossils, &c. Please state how many required.—Mrs. Skilton, Brentford-end, Middlesex.

Viola sepincola offered for 101, 156, 159, 467, 535, 544, 598, 855, 907, 950, 954, 985, 1029, 1059 c, 1115, 1133, 1194, 1212, 1286, 1295, 1319, 1453, 1655, 1672, L. Cat., Ed. 7.—W. H. Beeby, 2, Outram-road, Addiscombe, Croydon.

Orbiculina, from Bermuda, a beautiful object, well mounted, in exchange for other good slides.—J. Ford, Wood-view, Newbridge-crescent, Wolverhampton.

Æcidium Urticæ, Æc. Ranunculacearum, and *Puccinia Malvacearum* to exchange for other unmounted micro-fungi.—List to H. J. Roper, 5, Lausanne-road, Peckham, S.E.

For Snake's-head Coralline (*Anguinaria spatulata*), unmounted, send stamped envelope and object of interest to W. H. Skan, 15, Brownlow-street, W.C.

Wanted Slides or Material (Triceratium Diatoms) and Polyzoa tentacles extended, for well-mounted slides of Alyssum or *Hippophae rhamnoides*.—E. W. Burgess, 35, Langham-street, London, W.

First-class Micro-slides offered in exchange for live Water Beetles—*Dyticus marginalis, Hydrous piceus*, and *Acilius sulcatus*.—H. Vial, Crediton, Devon.

A quantity of Cambridge Greensand Fossils in exchange for others, especially *Crustaceans* and *Echinoderms*.—John W. Carr, Union-terrace, Cambridge.

Orchis incarnata and *Linum perenne* for other rare plants.—John W. Carr, Union-terrace, Cambridge.

I have a 4-joint Telescope, draws to 17 in., to exchange for Lepidoptera.—G. F. B., 23, Rosemary-street, Islington, N.

I have eight numbers of *Science for All* (from commencement up to present month), a capital stuffed squirrel, and good nests of Butcher-bird, Yellow-hammer, and Bullfinch.—Wanted, British birds' eggs, in sets, side-blown, Lepidoptera or store-box; Natural History books; or offers.—W. Barrett Roué, 165, White-Ladies'-road, Bristol.

Lond. Cat., Nos. 31, 102, 162, 185, 273, 277, 295, 296, 464, 634, 515, 560, 609, 865, 1013, 1053, 1123, 1213, 1276 1318, 1342 b, 1378, 1383, 1411, 1418, 1428, 1462, 1472, 1476, 1527, 1535, 1537, 1538, 1556, 1641, 1657, 1661, and 1666, for 623. 626, 631, 637, 640, 647, 649, 657, 658, 663, 676, 691, 693, 698, 725, 733, 746, 747, 759, 772, 802, 826, 864, 870, 905, 938, 965, 975, and 1007.—Wm. West, Chemist, Bradford.

Well-mounted physiological specimens in return for any unmounted material of interest.—George Baker, 37, Cross-street, Islington, N.

Send well-mounted slides of Foraminifera or Polariscopic objects for others, or mounting materials. List sent.—E. Atkins, 200, Essex-road, Islington, London.

Wanted, Blackwall's "British Spiders," vol. ii., in exchange for Science-Gossip from the commencement, 12 vols., bound in cloth; or cash.—Address, James Grant, care of Editor of Science-Gossip.

Wanted, a pure and clean gathering of Volvox globator, (communicate before collecting). First-class slides in exchange.—E. Wheeler, 48, Tollington-road, Holloway, N.

BOOKS, &c., RECEIVED.

"West Yorkshire: An Account of its Geology, Botany, &c." By J. W. Davies, F.L.S., and F. A. Lees, F.L.S. London: L. Reeve & Co.

"The Physical System of the Universe." By S. B. Skertchley, F.G.S. London: Dalby, Isbister, & Co.

"The Creation of Moses and Science in Harmony." By the Rev. Dr. Stewart. London: Eliot Stock.

"The House of Life." By Mrs. Miller. London: Chatto & Windus.

"A Science Primer." By Dr. McVicar. London: W. Blackwood & Sons.

"Phosphates in Nutrition." By M. F. Anderson. London: Baillière & Co.

"Science Made Easy." By Thos. Twining. London: Hardwicke & Bogue.

"A First Catechism of Botany." By John Gibbs. Chelmsford: E. Durrant & Co.

"Popular Science Review." July.
"Land and Water." ,,
"Chambers' Journal." ,,
"The Country" (New York). June.
"Familiar Science." ,,
"Potter's American Monthly." ,,
"Journal of Applied Science." July.
&c. &c. &c.

Communications received up to July 8th, from:—A. J. R. S.—T. H. C.—J. W. C.—J. C. A.—H. S.—C. P.—F. W. S.—G. T.—J. S.—M. R. W.—C. L. B.—T. W. D.—J. H. L.—J. C.—J. A. K.—J. P. S.—A. B. M.—A. J. R. S.—J. F. R.—J. H. M.—E. E. E.—E. W. H.—Dr. R. B.—C. P.—J. A. W.—E. W. W.—E. W. A.—J. B. B.—B. M. W.—R. L. P.—C. M.—J. W. J.—J. T. G.—T. H. C.—F. H. A.—Dr. J. S. H.—M. S.—W. H. L.—W. H.—G. P.—G. S.—Prof. P.—A. J. R.—D. D.—F. A.—C. M. B.—B. K.—H. W.—S. C. S.—J. H.—W. W. I.—M. S.—J. W. S.—R. A. D.—W. E. R.—H. G. R.—W. B. R.—F. J. B.—G. S.—H. V.—W. H. S.—E. W. B.—J. C.—W. S. S.—C. H. G.—W. C. C.—A. P.—J. W. C.—A. A.—G. F. B.—J. L.—J. W.—W. M. P. J. F.—T. W. B.—W. H. B.—R. S.—A. C.—T. S. S.—H. J. I. L.—W. H. B. P.—T. H. C.—W. H. C.—M. H. R.—G. F. B—D. W.—J. C.—R. W.—M. J. W.—J. P. G.—W. W.—J. I.—H. J. T.—E. A.—H. B.—G. B.—H. T. S.—Dr. E. de C.—E. B. G.—&c. &c.

NOTES ON CELERY AND OTHER SMALL SALADS.

By H. G. GLASSPOOLE.

CELERY (*Apium graveolens*) belongs to the Umbelliferæ order of plants, and in its wild form is found growing in ditches and marshes near the sea, in Europe and in Britain, where it is known under the name of Smallage; but in this state it is wholly unfit for food, having a peculiar coarse rank taste and smell, being considered poisonous to man, and is not even relished by animals. Cultivation, however, has transformed this suspicious plant into one of the most agreeable and wholesome of all our esculents. This species of Apium appears to have been known to the ancients, for it was reckoned by them as one of the greater aperient roots, and Pliny states that it hath a peculiar virtue against the biting of venomous spiders. There is no account from which we can gather that the ancient Greeks and Romans were acquainted with the method of bleaching this plant, and thus rendering it fit for food. By most of our old herbalists, it is mentioned under the name of Smallage, and only used by them as a medicinal plant. Gerard tells us that the leaves of it boiled in hog's-grease and made into the form of a poultice, taketh away the pain of whitlows on the fingers, and healeth them. Culpeper recommends that the juice of this plant, mixed with honey of roses and barley-water, be used as a gargle by those who suffer with sores and ulcers in the throat and mouth. Bartholomæus Lorn, in his "Botanologia," (published in 1714), mentions that the roots and seeds of Apium were used medicinally in his day. This esculent appears to have been cultivated for the table at the early part of the seventeenth century, for John Ray, the celebrated botanist of that period, says that, if this plant is neglected, it will degenerate into its first unpalatable state. We are indebted to the Italians for the method of its cultivation, and also for its name. Evelyn, in his "Acetaria" (published 1699), says "Sellery was formerly a stranger with us, and not very long since, in Italy itself." He tells us that it is not a distinct species of Smallage, or Macedonian parsley, though, by its frequent transplanting, somewhat more hot and generous, and sweeter-scented. We have, he says, "the best seeds from Italy, whose tender leaves and blanched stalks do well in our sallets, as likewise the slices of the whitened stems, which being crisp and short, first peeled and slit longwise, are eaten with vinegar, oil, salt, and pepper. And for its high and grateful taste is ever placed in the middle of the grand sallet, at our great men's tables and Prætors' feasts, as the grace of the whole board." In our oldest seed-lists we find that two varieties of celery were introduced from Italy under the name of Red and White upright Italian celery. It is stated in the "Monthly Magazine and British Register," for July, 1797, that the seed of a new sort of celery, from the island of Samos, had been introduced into the county of Norfolk, which grew to the height of three feet, and possessed other superior properties. Celery may be grown to a very large size, for Loudon states that, in 1815, a plant was taken up at Longford, near Manchester, which weighed 9 lb. when washed, with the root and leaves still attached to it, and measured 4 feet 6 inches in height. It was of the red sort, perfectly solid, crisp, and firm, and remarkably well-flavoured. There is a variety of this plant called Celerica, or Turnip-rooted celery (*Apium graveolens napazeum*); it is more hardy than the upright varieties: of this the root is the only part used. It attains to a considerable size, especially in Germany, where it is much esteemed, both prepared by itself and in conjunction with other herbs as a salad. It rarely forms an object of cultivation in English gardens. Sir Joseph Banks and Dr. Solander found in considerable quantities, on the coast of Terra del Fuego, wild celery, which appears to be possessed of wholesome

qualities, as it was found a very useful ingredient in the soups for seamen, because of its antiscorbutic properties. Celery contains sugar, mucilage, starch, and a substance resembling manna sugar, which acts as a stimulant. A decoction made from the seed and drunk as tea is often recommended in some diseases by village herbalists. Celery is regarded as a lucky plant by the modern Greeks, and is hung up in rooms, placed on silkworm-frames, and given to children.

The common name appears to have been derived from Italy,—*sellari*, under which it was introduced in the old seed-lists into this country, but it is found in old works, spelt in various ways; thus, Sellery, Celeri, and Celery.

The etymology of the botanical name, Apium, appears uncertain. Some authors think it is derived from the Celtic Apon, water, from the place where the plant grows; others state it is from *Apis*, a bee, because these insects are fond of it. Celery has quite supplanted our native Alexander's (Smyrnium Olusatrum), which our forefathers used to eat as a common salad.

Among other herbs which are sometimes to be found in the salad-bowl, are the various Valerianella, or Lamb's lettuce. The French call them Salade de prêtre, from their being eaten in Lent. Evelyn says they certainly deserve a place among the penitential herbs, for the stomach that has admitted them is apt to cry peccavi. The leaves of Burnet (*Poterium sanguisorba*), when bruised, have the smell of cucumber: in former time this plant was in great repute. A small low thistle (*Picridium vulgare*), is often used in France and Italy, both as a salad and greens. Bon Jardinier says it tastes a little like mutton. The flower of the Judas-tree (*Cercis siliquastrum*) and leaves of the Wood-sorrel (*Oxalis acetosella*), when mixed with other herbs, give an agreeable acid flavour to the salad.

Dr. Thomas K. Chambers, in the "Manual of Diet in Health and Disease," says, "Salads ought to form an important article of diet in every family. The salad ought to be dressed by one of the daughters of the house after she has dressed herself for dinner, singing, with her clean cool fingers, sharp silver knife, and wooden spoon—

> "Weaving spiders, come not here:
> Hence, you long-legged spinners, hence;
> Beetles black, approach not near;
> Worms nor snails, do no offence."

The purity of the salad-bowl is also of great importance. In the days of the Tudors the cooks were accustomed to mix their salads in a silver saladier, or some other vessel of metal which was affected by the chemical action of the acids so composing the mixture, and must have proved deleterious to those who partook of it. Evelyn, the great reformer in the art of salad-making in those days, says, the proper material for the salad-bowl should be porcelain, or of Holland delf-ware. We find in the writings of our old poets and dramatists allusions to salads, as is shown in the following conversation between Lafeu and the Clown in "All's Well that Ends Well":—

"LAFEU. 'Twas a good lady, 'twas a good lady; we may pick a thousand salads, ere we light on such another herb.

CLOWN. Indeed, sir, she was the sweet marjoram of the salad, or rather herb of grace.

LAFEU. They are not salad herbs, you know, they are nose herbs.

CLOWN. I am no great Nebuchadnezzar, sir; I have not much skill in grass."

The author of the "Book about the Table" states that Poetry seized the dish to use it as an emblem of vernal freshness and greenness.

Shakespeare's Cleopatra says—

> "My salad days,
> When I was green in judgment."

Our forefathers were accustomed to introduce the salad into some of their wise and pithy sayings, for among our English proverbs we find the following:—

> "A fool can pick a sallet as well as a wise man."
> "He would live for aye, must eat sallet in May."

The following is a translation of a Spanish proverb: "Four persons are wanted to make a good salad. A spendthrift for oil, a miser for vinegar, a counseller for salt, and a madman to stir all up."

Dr. Doran, in his "Table Traits," tells us of a certain Frenchman who made his fortune by making salads for the aristocracy of England. Chevalier d'Albignac, one of the refugees which the great Revolution had cast on our hospitable shores, where he, like many of his unfortunate countrymen, contrived to subsist on a small pittance allowed him by the English Government, was one day dining with an affluent friend in the coffee-room of a fashionable hotel; he took upon himself to make a salad, and the way he handled and mixed the preparation attracted the attention of a young nobleman who was dining with another party in the same room. The nobleman approached the foreigner, and politely entreated him to mix a salad, French fashion, for his table. M. d'Albignac consented, and made such a one that put the four gentlemen into a state of uncontrollable ecstasy. His complaisance and communicativeness to the young nobleman and his friends had agreeable results, as they did not let the poor Frenchman depart without slipping into his hand a golden fee. A few days after M. d'Albignac received a letter from a certain lord, politely requesting him to repair to his house in Grosvenor-square for the purpose of mixing a salad for a dinner-party he was about to give. The Chevalier obeyed the summons, and after performing his mission returned home, richer by £5 than when he went out. His marvellous salads were soon the talk of the town. The "gentleman salad-maker" was the hero of the hour, and ladies of the highest fashion, we are told,

were heard rapturously commending his "works" in gilded salons, or avowing they could not live another week without devouring one of them. The lucky Frenchman was soon enabled to start his carriage, and might be seen driving from house to house during the dining hours of the aristocracy, attended by a servant, who carried a mahogany case, which contained the various ingredients for concocting his salads, according to the taste of his employers. He opened a shop, where he drove a lucrative trade in sauces and other culinary dainties. Being a prudent and saving man, he managed to realize some 80,000 francs, 60,000 of which he invested in government securities, which stood just then at 50 per cent., and with the other 20,000 he purchased a little estate at Limousin, where he spent the rest of his days enjoying his well-earned fortune.

I conclude by introducing a

Receipt for a Winter Salad, written many years ago, at Castle Howard, by the Rev. Sydney Smith :—

"Two large potatoes, passed through kitchen sieve,
Unwonted softness to the salad give;
Of mordent mustard add a single spoon—
Distrust the condiment which bites so soon;
But deem it not, thou man of herbs, a fault
To add a double quantity of salt.
Three times the spoon with oil of Lucca crown,
And once with vinegar procured from town.
True flavour needs it, and your poet begs
The powdered yellow of two well-boiled eggs.
Let onion atoms lurk within the bowl,
And, scarce suspected, animate the whole.
And lastly, on the flavoured compound toss
A magic tea-spoon of anchovy sauce.
Then though green turtle fails, though venison is tough,
And ham and turkey are not boiled enough,
Serenely full, the epicure may say,
'Fate cannot harm me—I have dined to-day.'"

A HOLIDAY ROUND DORKING.

LIKE most of those who are engaged during the day with the bustle of City life, we were anxiously looking forward to rest and quietude in the country, where we could throw off for a while the routine and formality of business, and enjoy that sense of freedom which only the lover of nature can appreciate.

The longed-for time came at last, and after the usual amount of preparation we arrived at Cannon-street station, and were soon spinning away from dusty London into the more picturesque country. The sun was shining brightly into the carriage, and the atmosphere was anything but cool; but we were in excellent spirits, and such weather led us to hope that we should spend a very happy holiday, being particularly suitable for our chief pastime, entomology. At length we arrived at Dorking station, and everything around looked bright and promising, as we got into the conveyance which was to take ourselves and luggage to the town. We contented ourselves for the remainder of the day with a general survey of the town, which presents the appearance of a thriving but quiet country place.

We were greatly delighted on waking next morning to find that the weather promised to be a repetition of the day before. The first thing for us to do, after having enjoyed a good breakfast, was to settle in what direction we should go, as we were very anxious for the chase, and our nets and boxes were all in readiness. Leaving Dorking at ten, and not forgetting to fill our flasks with lime-juice, we took a friend's recommendation, and started off in the direction of Ranmer Common, distant about two miles. Just past the railway-station, South-Eastern Railway, we found a chalk-pit, and were not long in discovering that some sport was to be obtained therein. Getting over the railings a very bright-blue butterfly was seen; the gauze soon enveloped him, and he turned out to be the *Adonis*, Clifden Blue. He was sadly battered, as it was quite a month late for him, so we gave him his freedom, and away he went, no doubt happy to be released from our clutches. No sooner had we done this than we noticed a dull-looking little insect tripping sharply along, and settling for a moment on the blue flowers that grew in the chalk. This we soon found to be *Alsus*, the Bedford Blue, and we were very pleased to find them in great plenty and very nice condition. After another parting look round the chalk-pit, and having beaten a few blackthorn bushes unsuccessfully, with the exception of taking one *Jacobæ*, we went on our way to the road which leads to Ranmer Common. We had been told that parallel with the road was a grassy path, adjoining a very pretty estate called the Denbighs, and that we should very likely have some sport if we went that way, and, moreover, avoid the dust of the chalky road. Immediately we got into this path we noticed the intense contrast which the fresh foliage of the trees afforded from the dry chalk. On our left was a thick plantation of pine and fir-trees, and on our right a hawthorn hedge, separating us from the road, whilst peeping out from the grassy bank was an occasional patch of wild strawberry-plants, some in bloom, and others loaded with the pretty rosy-coloured fruit. This path soon widened into almost a glade, with a wonderful variety of herbage: blackthorn, whitethorn, juniper, clematis, privet, honeysuckle, and almost every imaginable kind of vegetation. The sun was now blazing forth, and we were out of the shade which the pines afforded; moreover, insect life was swarming all around us. The two common skippers, *Linea* and *Sylvanus*, were buzzing about in the utmost profusion; the Meadow Brown, *Mægeria*, was lazily flitting from one flower to the other, sometimes with that sombre quiet-looking butterfly, *Hyperanthus*, the Wood Ringlet; everything seemed so quiet and happy, affording such a contrast to the noisy city which we had only the day before quitted. Soon we came to another plantation, and then sport began in real earnest. What is that flying round the top of the pines, and occasionally descending to within reach of the net? We strained

our necks trying to capture one, and soon found it such hot work that our coats were off and satchels laid down, whilst F., who was not an entomologist, was not sorry to take a rest by seating himself on the stump of an old tree. Our nets had only got short walking-stick handles, so our chance of success seemed very small at first, more especially as there was a hollow between the path on which we stood, and the ground on which the plantation was situated; if we made an extra effort in our excitement to

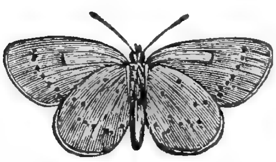


Fig. 130. Under side Small Blue (*Lycæna alsus*).]

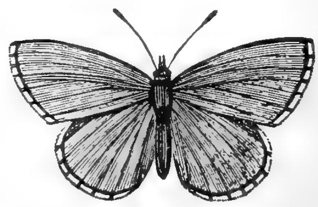


Fig. 131. Clifden Blue (*Lycæna adonis*) upper side of male.

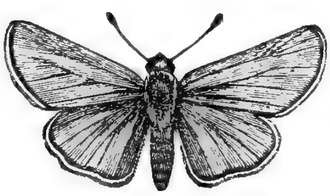


Fig. 132. Small Skipper, female (*Hesperia linea*).

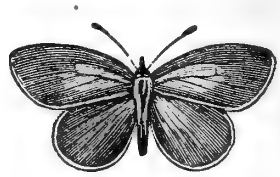


Fig. 133. Upper side of Small Blue (*L. alsus*).

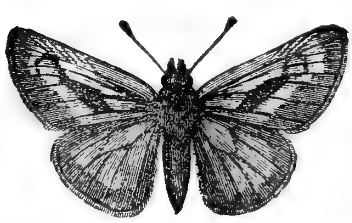


Fig. 134. Large Skipper, male (*Hesperia sylvanus*).

Fig. 135. Small Skipp er, male (*Hesperia linea.*)

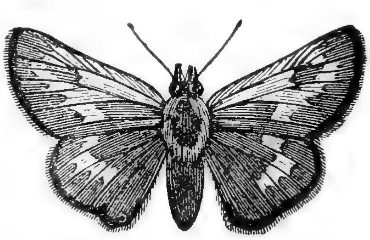


Fig. 136. Large Skipper, female (*Hysperia sylvanus* .

secure our prize, we were thrown from the path amongst the bushes below. But we were not thus to be disheartened, so taking a pull at our flasks, and wiping our perspiring faces, we again set to work. This sort of thing continued for nearly an hour, in which time we obtained about a dozen each of *Piniaria*, and discovered that it was nearly time to return home, without reaching Ranmer after all.

On looking around from the elevated position which we now occupied we were all struck with the marvellous view which presented itself. The railway lay in a valley, and on rising groun beyond stretched the well-wooded district around Leith Hill and Cold Harbour, and the contrast between the various kinds of vegetation was wonderful; towering above all was Leith Hill itself, standing out boldly from the clear blue sky, while on the right of the railway could be seen the long ridge of hills in the direction of Guildford. Streams meandered here and there, and the

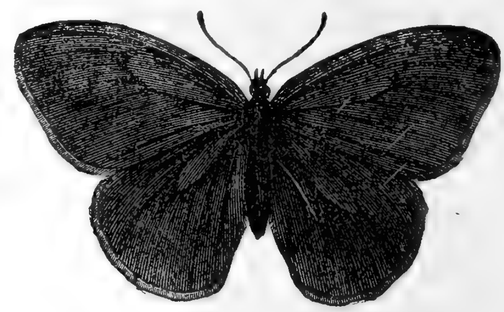


Fig. 137. Upper side of Ringlet (*Epinephile hyperanthus*).

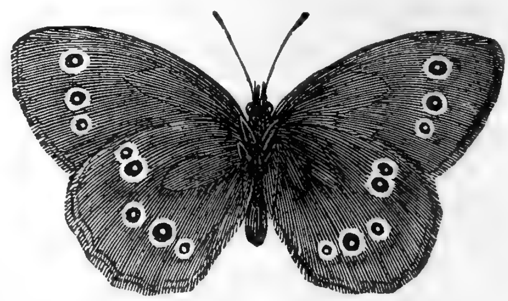


Fig. 138. Under side of Ringlet (*Epinephile hyperanthus*).

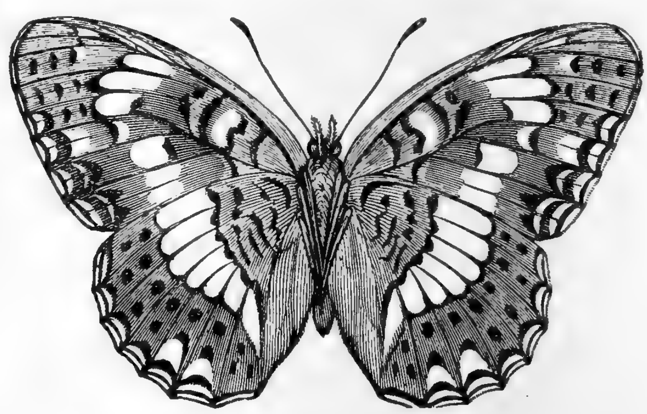


Fig. 139. Under side of White Admiral (*Limenitis sibylla.*)

Fig. 140. Upper side of White Admiral (*Limenitis sibylla.*)

sun shining on them made them sparkle like diamonds. We were indeed glad that we had come to Dorking, for we had never seen a finer piece of landscape before. Moreover, the intense heat, the cloudless sky, and the buzzing of the bees, gave a lazy look to everything around; the cows in the

adjacent meadow were swishing their tails and stamping their feet to release themselves from their summer pests, the flies, and we, too, found them by no means pleasing companions.

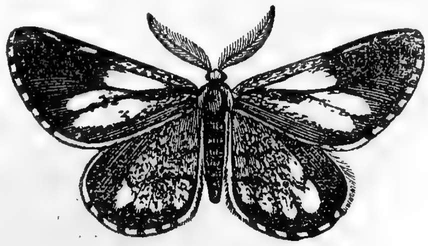


Fig. 141. Bordered White, male (*Fidonia piniaria*).

Fig. 142. Clay Triple-lines (*Æphyra trilinearia*).

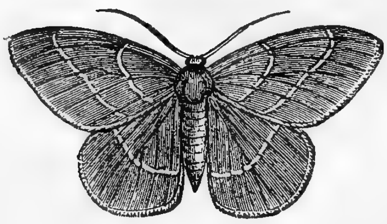


Fig. 143. Small Emerald (*Ionis vernaria*).

Fig. 144. Humming-Bird Hawk Moth (*Macroglossa stellatarum*).

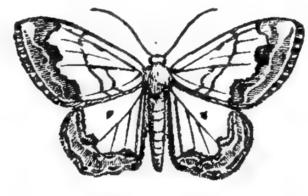


Fig. 145. Lace Border (*Acidalia ornata*).

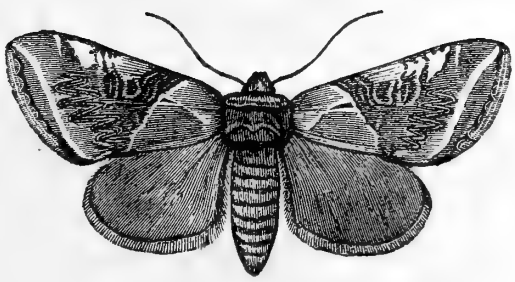


Fig. 146. Buff Arches (*Gonophora derasa*).

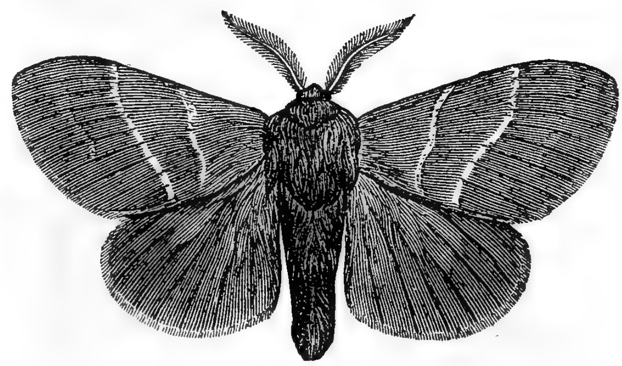


Fig. 147. Fox-Moth (*Bombyx Rubi*).

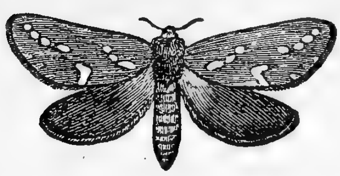


Fig. 148. Gold Swift (*Hepialus hectus*).

Fig. 149. Chalk Carpet (*Eubolia bipunctata*).

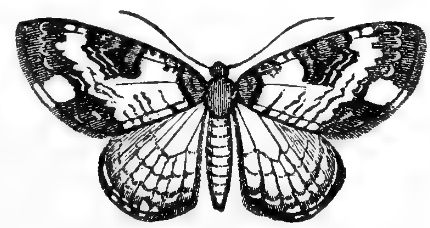


Fig. 150. Chalk Carpet (*Melanippe procellata*).

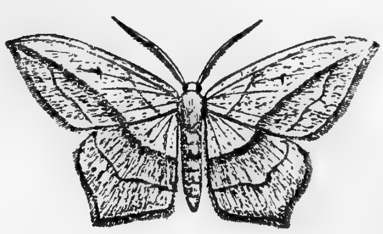


Fig. 151. Blood-Vein (*Timandra amataria*).

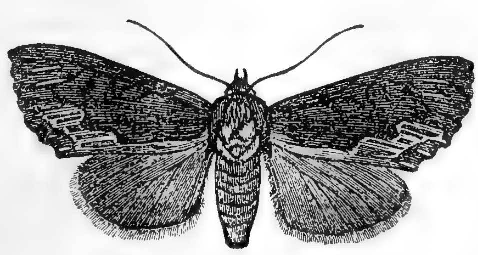


Fig. 152. Bird's Wing (*Dipterygia pinastri*).

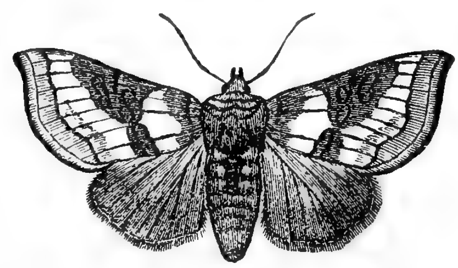


Fig. 153. The Gold Spot (*Plusia fiducæ*).

In the afternoon we went for a drive to Shiere, a village about half-way between Dorking and Guildford, which we enjoyed very much, after having had a good tea, and partaken very freely of strawberries, which the landlord had just gathered from his garden.

The next day we determined to reach Ranmer Common, and accordingly made arrangements to have a late dinner. This time we took the road, on the right hand side of which was a stone wall, with a plantation above. Flying up and down this was *Stellatarum*, the Humming-bird Hawk-moth. It gave us a rare chase, with no success, so we made up our minds we would hurry on towards the Common. On arriving at the end of the road, and unfastening the gate, we found ourselves on a large tract of woodland and common, which seemed to invite us to more

closely examine it, which we accordingly did, and set off down a long glade, which made us think it should be called a wood rather than a common. The trees were chiefly oak, with an undergrowth of bramble, honeysuckle, and blackthorn, and on going a little farther in, we came upon a magnificent group of wild foxgloves, all in full bloom, and some of them as much as seven feet high. What was that large golden butterfly which just flew over our heads? exclaimed J. It must be *Paphia*, and sure enough it was, for no sooner had we spoken than back he came, and settled on a bramble, right in front of us, flapping his wings in the sunshine as if making fun at us. For a moment we were speechless with pleasure and admiration, for this was the first time we had seen any of the large Fritillaries on the wing. Then quickly raising his net without letting the shadow intervene, J. gave a swift stroke over, and the silver-washed Fritillary was safely in his net. We did not have to wait long before seeing several others as we went farther down the glade; they all flew very swiftly, and appeared very fresh on the wing, it being only the second week in July. After we had obtained about half-a-dozen each, and having captured a few *Thec. quercus* flying round the oaks, together with some *Trilinearia*, which we beat out of some beeches, we resolved to try the old wall again, and return to the Common next day. On our way back we managed to capture three *Stellatarum*, and then we turned into the grassy path before mentioned. In one of the fields the grass was particularly high, and we thought it not unlikely something might turn up in it. We soon found that we were to be rewarded for our trouble, for we obtained about twenty of that delicate little geometer, *A. ornata*, and also discovered *A. Galathea* in the neighbourhood. We espied the first one, seated on a thistle-head, evidently only just emerged from the chrysalis. This was a very agreeable surprise, as we had neither of us taken *Galathea* before. We took as many as we wanted, and then lay down under the shade of a yew-tree, and watched them bobbing up and down in the long grass. Whilst dreamily passing the time in this way, suddenly something whizzed by like a great bee, and then back again, circling round the meadow in a very giddy way; then it seemed as if making straight for me, so getting my net in readiness, with a swift sweep, I secured it. What could it be? It buzzed up and down the net with great vehemence, and I was very anxious to see it safely bottled in the cyanide. When this was done we found that we had captured *B. rubi*, the Fox-moth, and a very hot chase we had for the other two we secured. We also took a few specimens of *Corydon*, but it was rather early for them, and we knew that each day would make them more plentiful.

In the evening, by beating the neighbouring bushes, we obtained *A. ornata*, *emarginata*, *amataria*, *vernaria*, and *procellata*. The whole of the week was just as fine as our first day, and on looking over our diaries, we had captured one *Sybilla*, one *Syringaria*, seven *Albicillata*, about twenty *Imitaria*, and nine *Adippe*, and we could have taken as many *Galathea*, *Paphia*, *Corydon*, and *Alsus* as we cared for, not to mention the swarms of Burnet moths and commoner butterflies which frequented every meadow. We tried sugar, but with no success, but by dusking and beating, we had obtained *Chrysitis*, *Urticæ*, *Derasa*, *Pinastri*, *Fulvata*, *Pyraliata*, *Didymata*, *Albulata*, *Rubidata*, *Trilinearia*, and several other geometers, whilst, settled on thistle-heads in the day-time, we took a few specimens of *Conigera*.

We had during the week paid a visit to Box Hill, and very much we enjoyed the cool shade afforded by the copious foliage. On arriving at the top a very extensive view is presented, stretching right away to the downs of Sussex, the marvellous variety of woods, rivers, and villages, forming a panorama beyond description. Height 800 feet.

So far we had had wonderful weather, not a drop of rain had fallen, and the same bright prospect was before us when Monday morning came, and we decided to go for a walk in Betchworth Park, about a mile distant from Dorking on the Reigate Road, in which is a magnificent avenue of lime-trees, and we were told that had we come a month earlier we should have found the scent of the bloom almost overpowering.

The river Mole runs through the park. It is a dull-looking stream, moderately wide here and narrow there, deep here and very shallow there. I think most of the fish to be obtained in it are tench, carp, eels, &c., those kinds which frequent muddy still streams. But although the water itself is not very inviting, the scenery along its banks is very picturesque, especially at this particular spot, where the foliage of the park sometimes forms quite a bower over the water. After walking through the park we came out again into the road, and then across some corn-fields in the direction of Box Hill, on climbing the sides of which we were greatly delighted to again find our friends the wild strawberries in plenty, with which we regaled ourselves for some little time, thus we worked round to Burford Bridge, and then home along the road to Dorking.

In the afternoon we went for a drive to the Holmwood, a large tract of common and forest land, south of Dorking, on the Horsham Road, where a camp was being held, the white canvas of the tents standing out boldly against the green of the forest, whilst about every hundred yards we went we came upon a fresh batch of geese, which always greeted us with a quack! quack! or hizz! hizz! In all our rambles on the commons we met with these consequential creatures, who seemed as if they were enjoying themselves while they had the chance. On we went until we arrived at Ockley, and then back along quiet country lanes by Abinger and Wotton.

The nut-bushes seemed loaded with the young nuts, and the banks covered with a profusion of ferns; moreover the woods and meadows adjoining Leith Hill seemed to present an unusually fresh appearance for the time of year. In the evening we tried sugaring in the Glory, a wood almost in Dorking, leading on to the Holmwood; it was, however, no good, but on our way back, flying over the corn, we could have taken as many as we wanted of *Palleus*, besides the following insects by dusking, *Hectus*, *Ocellata*, *Sambucata*, *Thymiaria*, *Albicillata*, and *Adustata*, and flying round an old wall we discovered *Perla* in plenty.

The next day we again went to Ranmer, on our way turning out swarms of *Bipunctata* from every bank. We went down our old glade until we came to a spot where the wood had only latterly been cleared, and which abounded in thistles, teasles, nettles, &c. We sat down for a minute or two to rest, and found that we had discovered a regular stronghold for *Paphia*. They came sailing over our heads and settled on the tallest thistles, and then off again to exercise their wings. This sort of amusement we very much enjoyed; we also took several specimens of *G. rhamni*, and I had the good fortune to take a battered specimen of *Sibylla*. We then went through a gate into a sort of plantation, with waste ground on the right; every fresh step we took turning out a lot of wild rabbits, which were on the path enjoying themselves in the sunshine. On this waste land was a great deal of ragwort, and on inspecting the same we found several larvæ of *Jacobæ*, in fact on going a little further the ragwort heads were quite tinted with their orange-coloured bodies. Here we also saw a specimen of *Aglaia*, but we were not able to get near him, a few *T. quercus* only rewarding us. During the week we came several times to the common, and always found some new employment in walking along the glades, sometimes under the shade of the oaks, sometimes penetrating into the thick, and getting ourselves nicely pricked with the brambles, listening to the song of the thrush or blackbird, sometimes hearing the melancholy Coo! Coo! of the ringdoves, or pausing to catch the distant sound of Cuckoo! Cuckoo! All these delights are only to be realized, they cannot be recorded.

Our next visit was to Leith Hill, five miles distant from Dorking, which was particularly enjoyable. We walked to Cold Harbour through wooded lanes, in which the trees sometimes met, forming a beautifully-shaded walk, and being exceedingly picturesque and romantic. Here we had some lunch, and then commenced to ascend the hill. The path is very rough, especially for a pony, which we saw pluckily struggling up. The sides of the hill are covered with a growth of bracken and furze, with an occasional plantation of young fir-trees. On arriving at the top and going up into the tower, a magnificent view presents itself; and it is said that on a clear day twelve counties are visible. We could distinctly see without the aid of a glass the clump of trees at Chanctonbury Ring, near Worthing. A few children were scattered here and there gathering the whortleberries which grow on the hill, and from which they say a very delicious jelly is made. Leith Hill is 993 ft. above the sea-level, and is the highest elevation in this part of the country. Like everything else, this sort of thing was not to last for ever, as the time was quickly passing on, and rapidly bringing our holiday to a close; so we resolved to have a good turn at collecting for the two or three remaining days. During this time *Colias Edusa* had been coming out in plenty, and we captured as many as we wanted, flying over the lucerne fields near the railway-station, and amongst them were fortunate enough to come across two *Helice*. I also took one *Ochroleuca* settled on a thistle-head. We obtained moreover *Cardui* and *Rhamni* in fair abundance, besides turning out *Semele* on the dry hill-sides. If we had only had good sugaring we should have had a very successful holiday in an entomological point of view, for novices like ourselves; but we were far from discontented, as the lovely weather and variety of the country would require a very peculiar individual not to appreciate. Our only regret was that we had got through the time allotted to us; and it was with somewhat of chagrin that we said adieu to the shady woods and open meadows, and returned once more to our usual vocation, a great deal the better both in mind and body for our fortnight's holiday.

A. J. R.

LIVE TOADS IN LIMESTONE ROCKS.

I HAVE lately been working geologically among the culm-measure limestones of North Devon, and there I heard the oft-repeated story of a live toad having been disinterred from the solid rock. Unfortunately it was an event of the past, and I did not see either the toad or the rock from which he came. But I can testify to the good faith and general intelligence of my informant, who assures me that he saw the toad, which had just been wantonly crushed by the quarrymen, and that he also saw the mass of rock which had been cleft, and the cavity in which the toad had been. He further assures me that the rock was perfectly solid, without flaw, joint, or perforation of any kind leading to the cavity. He has no reason to think that the quarrymen intended to deceive him, and he himself evidently intends faithfully to describe what occurred.

At about the same time that this information was given me, a similar case was reported to me from the limestone near Totnes, in South Devon. In this instance the quarryman who saw the toad taken from the rock has been well-known to me for years as a steady honest man of superior intelligence. But here again I was not an eye-witness, and can only repeat

what I am told. I am, however, firmly convinced that the man himself fully believes what he reports.

Concurrent testimony, if sought, would be obtained from many independent sources, and yet I find that scientific men are generally disposed to treat such stories with simple incredulity. But surely the phenomenon is worth investigation. No British jury would believe that the quarrymen in all parts of England were leagued together to impose upon the public; nor would any man of science believe that the toads were really imbedded in homogeneous rock. Until a better solution can be offered, I may venture to suggest the following:—

It is well-known that all limestone rocks abound in fissures and joints, which may be and often are filled up with angular debris. At Westleigh, in North Devon, there are many thick beds of breccia alternating with highly inclined and vertical strata, the breccia being just as hard and serviceable as the stratified rock. In some cases where the cementing carbonate of lime has not been *coloured*,* the two varieties of rock might not be distinguished at first sight, even by a geologist, still less by an ordinary observer. These breccias may be of any post-carboniferous age, and may be still in the process of formation.

We have then only to imagine our toad to have accidentally or purposely got into a fissure, and to have there found himself in what (from a batrachian point of view), we may call comfortable quarters. There, being of a phlegmatic temperament and of sedentary habits, he stood (or rather squatted) his ground, indifferent to the angular fragments which, from time to time, fell around him. Like Horace's "Vir justus ac tenax propositi," of whom it is further said, "Si fractus illabitur orbis Impavidum ferient ruinæ," so he also was not shaken in his sense of tenant's right by the "wreck of matter" which, in the form of rock-débris, threatened his cranium. Dripping water bearing carbonate of lime by degrees would change his home into a prison, cementing the congeries into the semblance of homogeneous rock.

How long a toad might live under such conditions, I do not venture to conjecture, but the many instances of modern conglomerates, and the stalactites which rapidly collect under newly-built bridges, would argue that the process of forming such a breccia as I have described need not necessarily have occupied many years. I submit, at least, that the independent testimony of quarrymen from many places remote from each other ought not to be set down as mere invention or exaggeration, but should be accounted for as above, or upon some better hypothesis, if such can be suggested.

W. DOWNES.

Kentispeare, near Collumpton.

* It is generally coloured red, owing to the proximity of Triassic rocks.

THE BIRTH OF A ROTIFER.

THE water from which my Rotifer was taken had been standing for some months in one of the marine tanks at the Brighton Aquarium, and was filled with dead mussels. The body, which was surrounded by a single row of filaments, resembled a *Paramecium*, but was longer and not so broad.

The head was blunt, and was beset with strong cilia, amongst which were three or four long filaments. This part of the animalcule was sack-like, and a broad sinus formed the mouth, which was fringed with cilia smaller than those at the margin of the head. A row of globules, about thirteen in number, commencing from near the mouth, extended the whole length of the body, within which could be traced three distinct bulbous sacks, connected by alimentary canals; near the posterior extremity a single dark spot was observed.

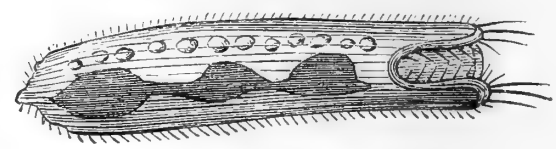


Fig. 154. First appearance of Rotifer.

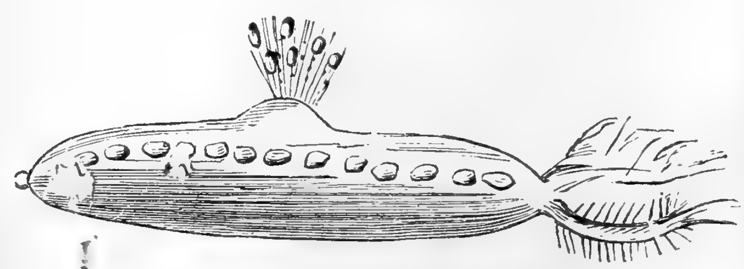


Fig. 155. Rotifer in act of emitting young.

The integument was marked with a fine series of horizontal lines. The animalcule had a peculiar mode of feeding. It first rubbed its gelatinous body against a mass of vegetable matter with which it happened to come in contact, to disintegrate it, as it were, and then pushed its head amongst the débris, grovelling like a pig, and using its cilia to draw the particles into its mouth. On moving the stage, another of the species was brought into the field. The upper part of the head was shrunken and dead, and was almost separated from the body; but round the lower part of the gullet the cilia were in rapid motion. The other part of the body was perfectly quiescent, even to the filaments, and was compressed and colourless. About midway down the Rotifer, a slight swelling commenced, which gradually increased. It then burst, and a violent disruption took place, which resembled a mimic Vesuvius. A jet of water issued from the orifice, followed by six minute, pellucid, oval creatures. Their motion was at first very sluggish, but they soon gained sufficient vital energy to prove beyond all doubt that they were endowed with life.

The young lingered over the body of the mother

for some time, and then, joining a community of atoms no larger than themselves, were lost beyond all identification. The vortex round the head of the parent ceased. The animal slowly dissolved throughout its entire length; and, in a few seconds, became one indistinguishable mass of inanimate matter. Having fulfilled its mission, it ceased to exist, leaving nothing but the integument, which retained its pristine outline.

JOHN DAVIS.

TERATOLOGY OF A CABBAGE-LEAF.

A CORRESPONDENT has kindly forwarded to us a specimen of cabbage-leaf, showing one of the most peculiar malformations we have seen.

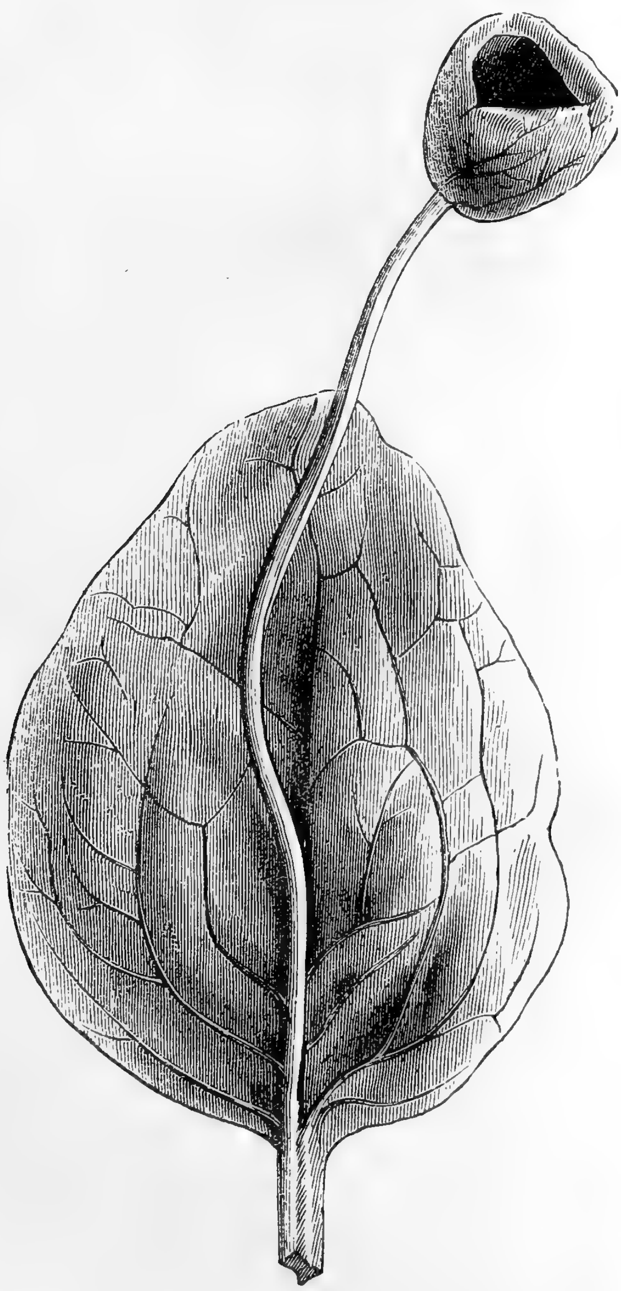


Fig. 156. Malformation of Cabbage-leaf: two-thirds nat. size.

The midrib of the leaf has become detached about an inch from the base, and exists as a separate stalk, exactly simulating an ordinary flower-stalk. Meantime the true leaf only just shows in its venation the place where the midrib ought to be, whilst the laminæ of the leaf are abbreviated so that the stalk extends nearly a couple of inches beyond the apex. At the summit of the stalk (or detached midrib) the laminæ have again grown, but the two external edges have been fused together in growth, so as to present the appearance of a gamosepalous calyx. We have shown the specimen to several botanists, who had not the slightest idea of its being a malformed cabbage-leaf. The accompanying sketch by Mr. J. W. Buck, B.Sc., is two-thirds the natural size of the specimen. On page 113 of "Vegetable Teratology," Dr. Masters figures and describes a similar malformation in a lettuce-leaf, and mentions the cabbage-leaf as occasionally liable to malformations of this kind. The fruit of the rose, he remarks, is only the dilated end of the flower-stalk, in which the true carpels become imbedded. "Between such a case and that of a peltate leaf with a depressed centre, such as often occurs to some extent in *Nelumbium*, there is but little difference." These malformations thus throw interesting sidelights, not only on the origin of such pseudo-syncarpous fruits as the rose, but also on the peculiar leaves of *Sarracenia*, *Cephalotus*, *Aristolochia*, and others.

HOW TO START A NATURAL HISTORY SOCIETY.

WE have repeatedly been applied to for information how one or two individuals fond of natural science should proceed in starting or founding a society for the furtherance of its study.

We have had some experience in this matter, and can honestly say we know of few organizations which may be made so mutually helpful or so socially pleasant for such a small outlay of money. What Mrs. Glass said of the hare is true of societies of this kind. You must first catch one or two people interested in some department of natural science. There are few towns or districts in Great Britain now where there does not reside some one who is a Fellow of one of the learned societies, and who has so far won his spurs. Such an one is generally willing to act as president, and to throw the weight of his influence into the scheme. The secretary should always be selected on account of the greater interest he takes in science, for we regard a good secretary as really more useful to a society than a president. The meetings of a young society should not be held too often, or there will soon be a dearth of papers. Once a month, in the winter, is quite often enough; and one paper only each night, the rest of the evening being taken up with discussion. It is a good practice to encourage members to bring something at every meeting for exhibition — something which strikes them as singular, and which they do not understand. This practice causes members to look out for objects, and develops the observing faculties. It is also useful in raising discussions and oral descriptions at meetings, and perhaps, eventually, in originating papers.

New societies should not aim too high. Let them accept papers on any subject connected with natural history, and endeavour to raise good discussions on them. The subscription fee should not be too much—never more than half-a-crown or five shillings a-year, or the pocket will affect the members. We have invariably found the most prosperous societies and clubs those which charged the smallest subscriptions. In almost every village, to say nothing of towns, there would be little difficulty in hiring, or even in obtaining free, some school-room, either in connection with church or chapel. Indeed, numerously attended churches and chapels have started scientific clubs of their own, so beneficial has it been found to found a society that will find intellectual work for young men. The rules of a young club should be as few and simple as possible, and as free from penal clauses. At first, it would be as well to think of nothing but mutual instruction in scientific matters. Afterwards, the careful study and cataloguing of the plants, insects, birds, fossils, &c., of the neighbourhood might be considered.

Some very young societies are ambitious early to appear in print, and to publish their own "Transactions" or "Proceedings." This is well enough when there is anything really worth publishing, but even then there are plenty of magazines willing to publish such papers, and able to give them a wider publicity than they could have obtained locally. Young societies soon find printing and publishing very expensive, and it is frequently a source of vexation to the members. This matter, therefore, should be left out of consideration when it is intended to start a new society. If there be any surplus money, let it be spent in purchasing such high-priced standard books or magazines as would perhaps be beyond the pockets of many members, and these could be circulated in the usual manner. We have known successful instances of members specially combining to circulate such books among themselves, in addition to any which might be obtainable from the society's library. The summer excursions should not be numerous—not more than two or three during the season. Half a day will be often found long enough to do a great deal of real good work in. If the society limits its members to the male sex, there is no reason why they should not enjoy the pleasure of ladies during the summer excursions. To conclude, the chief things to be considered are, (1) earnest study (no matter by how few, for the numbers will increase if the original members can only "learn to labour and to wait"); (2) an absence of any pretension to intellectual superiority; (3) an endeavour to make the membership as cheap and inexclusive as possible, so as to throw the society open to all classes—the only specification being a love for scientific subjects, even if there be not always the means or the opportunity to cherish it.

"BRUCE," THE MANCHESTER FIRE HORSE.

At the latter part of the spring of 1864 "Our Bruce" was born; he soon began to show signs of a very promising hunter, of over sixteen hands, and in due course commenced his training for the chase. At five years old he had grown to a beautiful animal, very docile and tractive—his mottled grey coat the pride of the groom and the admiration of his master. "Our Bruce," in the hunting-field, once stumbled, and, in consequence, lost the confidence of his master, who disposed of him to the Manchester Carriage Company. In the early part of the year 1870, he was sold by the Carriage Company to the Manchester Corporation for the fire-engine department, and commenced his duties on the 24th March. His general appearance, and kind, tractable, willing ways were soon noticed by the firemen, and in less than a month after he joined the brigade he was the favourite of the whole establishment, having pretty well the free run of the yard, in which he caused much diversion by his singular and funny ways. He was always full of innocent mischief, and one of his greatest delights was to chase the men about the yard. It sometimes happened that he was let out for a gambol when the children were playing. On such occasions it was most interesting to notice how careful he was in not going too near them. At other times, when the engines were in the yard, he seemed not to forget his early training as a hunter, and would amuse himself by jumping over the poles. When tired, he would lift the latch of the door and go into his stable, and just as easily, after a rest, when the stable-door was closed, he would let himself out again, or knock loudly at the door to attract attention. Near the stable-door there is a water-tap with a revolving handle. "Our Bruce" would turn the handle with ease and help himself to a drink. It sometimes happened that a hose-pipe would be attached to the tap; this would not cause him the least inconvenience; in such a case, after turning on the tap, he would lift up the end of the hose-pipe with his teeth and hold the end in his mouth until he had satisfied his thirst. Many curious anecdotes could be told about our pet: how on one occasion he picked up the end of the hose and wetted one of the firemen who had offended him; how, at a fire, he would stand amidst the greatest noise and excitement, with showers of sparks falling around him, and on his beautiful coat, only to be shook off; and at other times completely enveloped in smoke; but there was no shying or fretting under fire or smoke with "Our Bruce." He seemed to know that he had brought those who would fight that ruthless tyrant fire, and he stood proud and confident that before long he would return home with the victors, when, after being refreshed and groomed, he would again be ready, always first, for the next "turn out."

For nearly six years "Our Bruce" never missed going with the first machine, at the end of which time he was, in consequence of his fine appearance, and our desire to give him a less active duty in his old age, transferred from the fire-engine to police-patrol duty. We did not altogether lose our faithful animal's services, for one of his duties was to attend fires with the mounted police-sergeant (whose name was also Bruce) to keep back the onlookers, which he most effectually did for nearly two years, during which time he was as great a favourite with the policemen, rarely leaving a police-station without an apple, a piece of bread, or some mark of affection.

On the 7th of June "Our Bruce" fell sick; the veterinary surgeon was sent for, who pronounced him suffering from inflammation of the bowels. The usual remedies were applied, and everything was done to relieve his pain and make him comfortable, but to no avail. For three days afterwards he was never left for a moment, night nor day, and at the end of the third day he drew his last breath, surrounded by those who loved him well, and who had been taken by him to the scene of many a hard fight. A *post-mortem* examination was held the following morning to ascertain the cause of death. A stone (calculus) six inches in diameter, weighing five pounds eleven ounces, was taken from his bowels. This was, no doubt, the principal cause of the disease which led to the death of the fire horse, "Our Bruce."

Chief Fire Station, Manchester. A. TOZER.

BRAMBLES ABOUT LONDON.

By Dr. E. DE CRESPIGNY, Author of "A London Flora."

> "In the days when we went *blackberrying*,
> A long time ago,"

WE knew that blackberries were distinct from dewberries, and no more: happier in our ignorance then, than we now are in our knowledge, that there are blackberries and blackberries; and that *Rubus fruticosus* represents an aggregate of forty species, regarded by collectors as distinct, besides varieties. Of these, twenty-eight species are classed as occurring in the home counties, province III. of the "Cybele Brit." (see Compendium); but to what extent they severally prevail there are at present no records to show. Something, therefore, might be attempted towards ascertaining the range, comparative frequency, and particular habitats of the more uncommon kinds, assuming that the ordinary forms are generally distributed. The difficulty is not so much in being able to find them, as in the ability to appreciate the small and inconstant shades of difference by which many of them are to be distinguished, not only from each other, but also from intermediate forms or variations; because, placed as all are now on the common footing of separate species, we are no longer at liberty to assign any values to the difference between what were formerly considered species and what sub-species; added to which there is, comparing the London Catalogue with the books, no little confusion with regard to nomenclature. The difficulties in the way of correct diagnosis is only lessened to a certain extent by arranging the species into groups or sections; for unfortunately the lines of demarkation are by no means distinctly defined, and in doubtful cases we are at a loss for fixed rules by which we may be guided in determining to which of the sections our specimen should be referred.

Brambles are arranged in sections as follows:— i. Suberecti; ii. Cæsii; iii. Glandulosi; iv. Villicaules; v. Nitidi.

I. SUBERECTI: type, *R. suberectus.* This, found in boggy woods, is a northern plant, and is nearest the raspberry, *R. Idæus*, in habit; it is not found near London, but *R. plicatus* occurs in Tilgate Forest, near Tunbridge Wells, and *R. affinis* has been reported from Epping Forest. We have not met with either species; they may be known by their suberect, slender, terete stems, furnished with a few weak uniform prickles, and glabrous leaflets, which are often arranged in a sub-pinnate manner; that is to say, the terminal leaflets are either ternate with two pair of basal leaflets, or they are quinate with a single pairs of basal leaflets, but there is no continuity between the sets. Another characteristic of the group is a distinct white border to the margins of the sepals.

II. CÆSII. Subsection *a:* type, *R. cæsius.* We venture to suggest that the proper position of this group is next in order to the preceding one; with which subsection *a* has very much in common. *R. cæsius* may be regarded as a trailing form of *suberectus.* They are much alike in flowers and fruit, besides other points. *R. cæsius* is readily diagnosed, but when met with in its more robust form it may sometimes be mistaken for *corylifolius.* There are several varieties: *tenuis, ulmifolius,* &c. The stems are usually very slender, terete, and glaucous, furnished with many slender unequal prickles; leaves ternate, terminal one often lobed; sepals setose, and clasping the glaucous few-grained fruit. Plentiful by the banks of the Thames about Kingston, and in one form or another not unfrequent on damp, shady ditch-banks, which are seldom cleared or trimmed, at a little distance from the environs. It grows also by the Bave stream in the hollow W. of Wimbledon Common. Subsection *b:* type, *R. corylifolius.* This is a very common and also a very variable plant. Its characteristics, however, are so well marked that it can seldom be mistaken for a bramble of any other section. The stems are terete, although strong young shoots are sometimes obscurely angled; smooth, of a greenish subglaucous hue, somewhat rufous when old, furnished with uniform weak prickles and a few subsessile glands; generally

prostrate when unsupported; the leaflets are broad, doubly dentate, serrate, or biserrated, and remarkably imbricated, owing to the lateral pair being subsessile, and the basal ones entirely so; rugose above, pubescent below;* sepals ovate and tomentose; petals rotund white, sometimes pale blush (in *purpureus* they are pinkish); the panicle always corymbose; its flowering is both early and prolonged. It is a common hedge bramble about London. On the Finchley-road, near the station, for instance, and in the lanes leading to Willesden, it is plentiful. The leaves are often ternate by abortion; that is to say, the lateral pair are two-lobed, a peculiarity by no means confined to this species. *R. Balfourianus* and *R. althæifolius* are straggling forms belonging to this section, with large flat leaves, usually ternate, and large *cæsius*-like flowers. In *althæifolius*, the leaves are somewhat elliptical. They may be found on damp shady places and ditch-banks. We have gathered them in a lane between the "Spaniards" (Hampstead Heath) and Hendon.

III. Glandulosi. This section will also admit of subdivision. *a. Transition of the prickles into aciculæ, setæ, and hairs, abrupt;* that is to say, the prickles are clearly distinct from the other appendages; type, *R. glandulosus.* Stems subterete, trailing when unsupported; of a dingy dark-greenish or dark-red hue; prickles small, straight, weak; aciculæ, setæ, and hairs copious; leaves dull and green, slightly pubescent below; leaflets ternate, rarely quinate; of a rhomboidal or ovate form, with biserrated margins; sepals very glandular and furnished with a long acumen; petals narrow, white or pale blush; the panicle broad-topped; pedicels very slender, prickly, and glandular. Frequent in hedges, in the lanes and roadsides about London. *R. Guntheri* is a form of it with large, flat, thin, dark green leaves; leaflets ternate; straggling, decumbent, less prickly stem, and a long, open, leafy, few-flowered

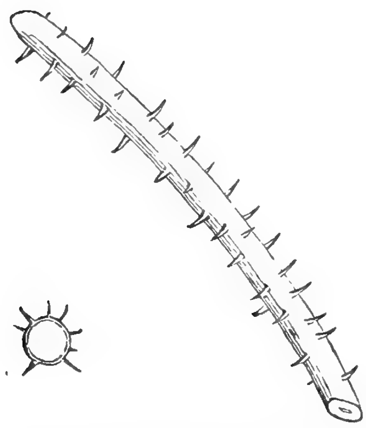


Fig. 157. Portion of stem and transverse section of *Rubus cæsius.*

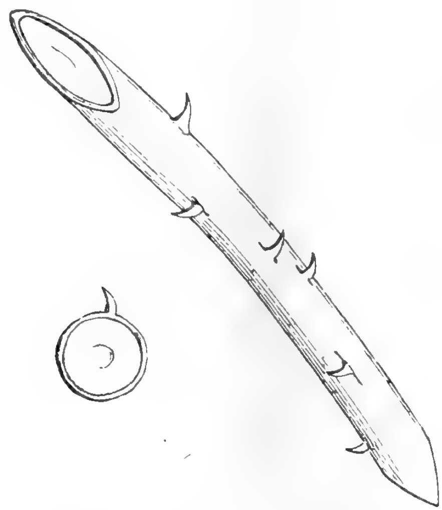


Fig. 158. Ditto of *R. corylifolius.*

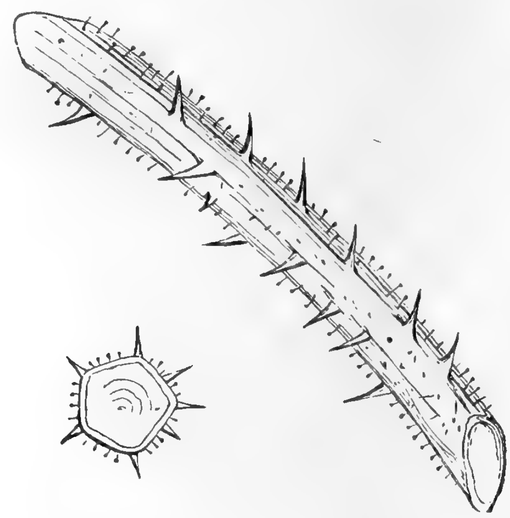


Fig. 159. Ditto of *R. glandulosus.*

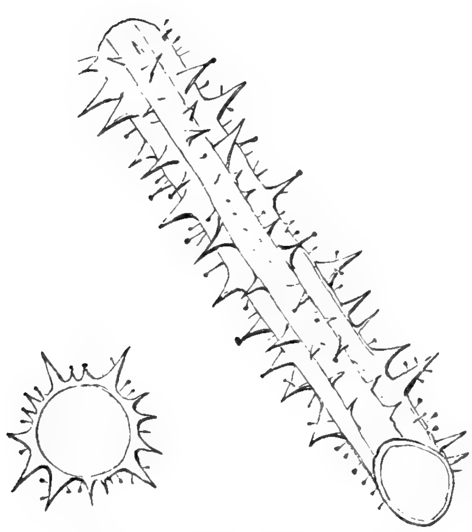


Fig. 160. Ditto of *R. rudis.*

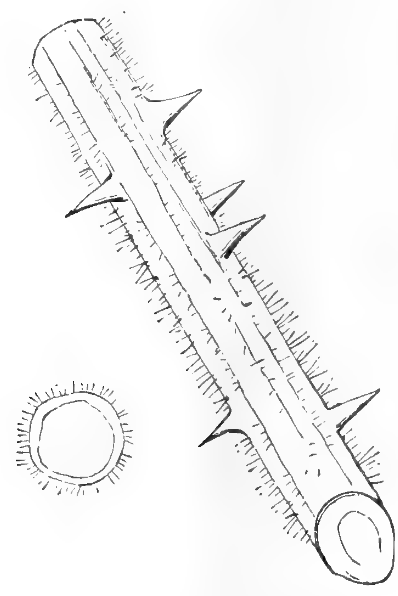


Fig. 161. Ditto of *R. umbrosus.*

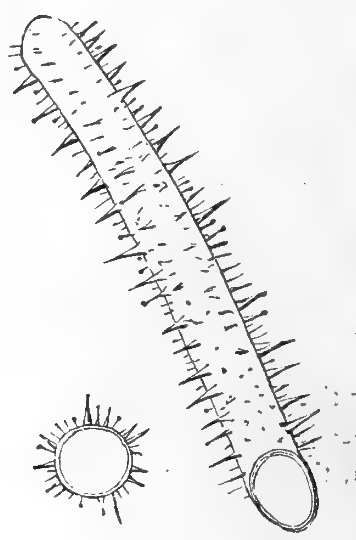


Fig. 162. Ditto of *R. koehleri.*

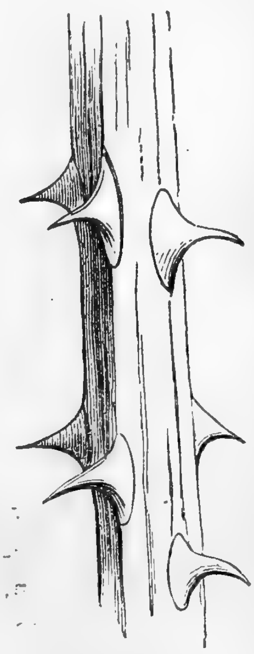


Fig. 163. Ditto of *R. discolor.*

* The pubescence of the under surface of the leaflets is seated on the veins; even when glabrous below the principal veins are never quite free from hairs. In brambles with strong arching stems, such as the nitidi and larger species of glandulosi and villicaules, the veins and pedicels are also furnished with small hooked prickles.

panicle; petals similar, but sepals without the long acumen of *glandulosus*. It grows in shady places; abundantly by the palings, northern border of Bentley Priory, Harrow Weald. *R. radula:* not frequent in hedgerows; more generally on the borders of copses in upland situations: on the outskirts of Harrow Weald Common and Pinner Woods, for instance. Stems arching, angular, of a dark, purplish hue; prickles strong (or rather, slender, from a strong broad base), nearly equal, patent; setæ and aciculæ short, numerous; hairs few; leaflets dull green, paler beneath; obovate, acuminate, narrow below, sharply and moderately dentate; sepals ovate, reflexed; petals white, obovate; the panicle is rather long, with lanceolate leaves and short corymbose branches; the prickles of the rachis are remarkably deflexed. *R. rudis* differs from the above in having much narrower leaflets, of an elliptical form, felted beneath, with coarsely serrated jagged margins; shorter panicle; pink petals and sepals furnished with rather broad, leafy points; the prickles are conical and slightly deflected. It is of less frequent occurrence than *R. radula.* We have gathered it on Harrow Weald Common. It is probably not very rare. *R. hystrix:* this is a trailing

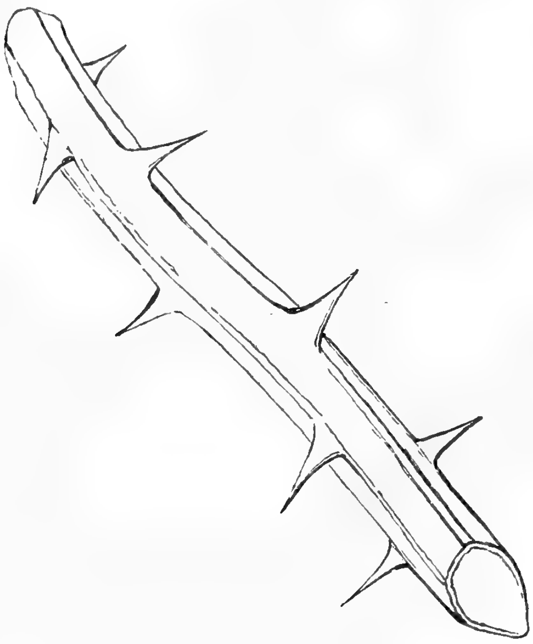


Fig. 164. Portion of stem and transverse section of *R. rhamnifolius.*

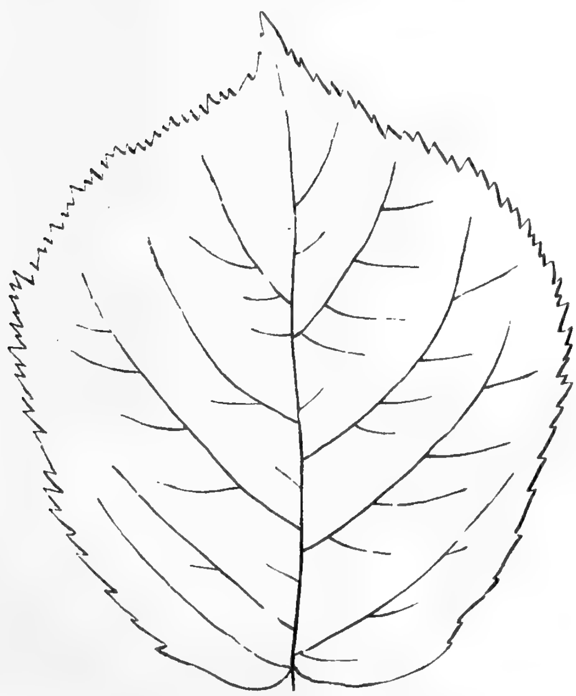


Fig. 165. Leaflet of *R. corylifolius.*

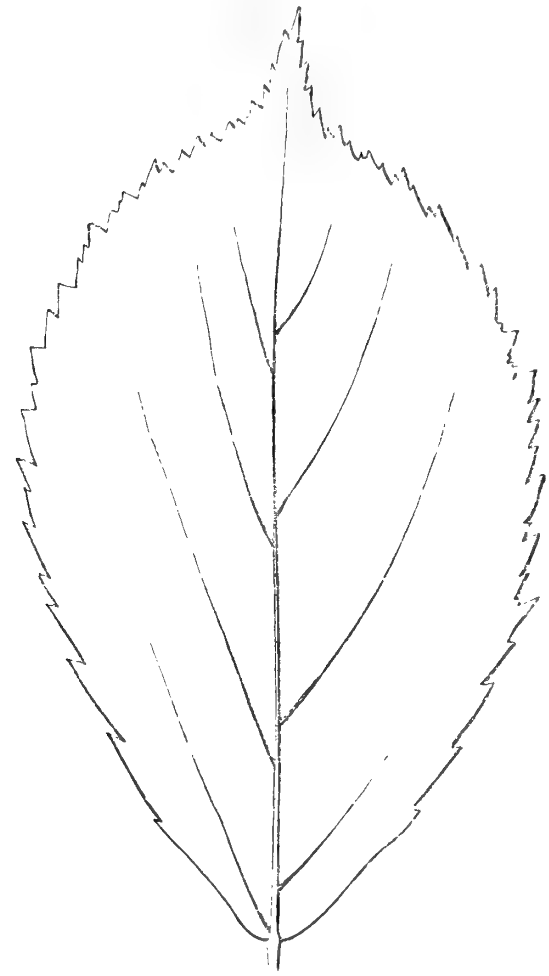


Fig. 166. Leaflet of *R. glandulosus.*

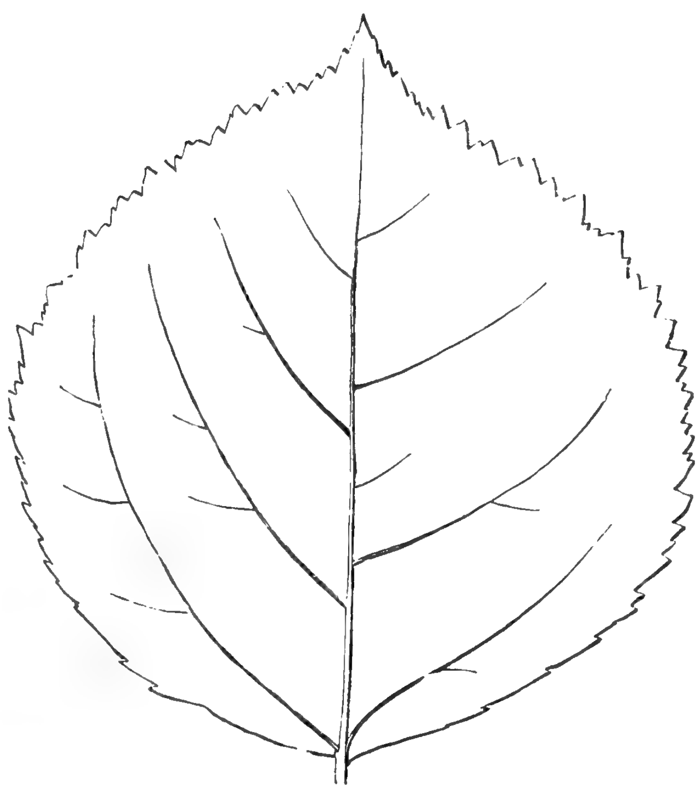


Fig. 167. Ditto of *R. umbrosus.*

bramble, with angular prickly stems of a light red colour, abundantly furnished with aciculæ, &c., all shorter than the prickles; the leaflets are of a light grass-green colour, finely serrated and of an oval form; panicle in shape, like that of *radula;* rachis wavy; petals obovate, pinkish; sepals lanceolate, with a long, leafy point. Rare: outskirts of Wormley Wood, Broxbourne. Allied to this is *R. pallidus* (or *rosaceus*), also a trailing but more prostrate bramble than *hystrix;* with bright red stems, and leaves of a lighter green and of a different shape; leaflets obovate acuminate, the terminal one somewhat cordate; the panicle simple and racemose; petals white; sepals ovate, not leaf-pointed. Harrow Weald Common. On Hampstead Heath and on the sandy heaths adjoining the Basingstoke Canal there is a trailing bramble, with an open panicle of pink flowers, remarkably leafy, pointed sepals, and leaflets green on both sides, which would seem to be *R. bloxami.* The stems are much less setose than in any other species of this section.

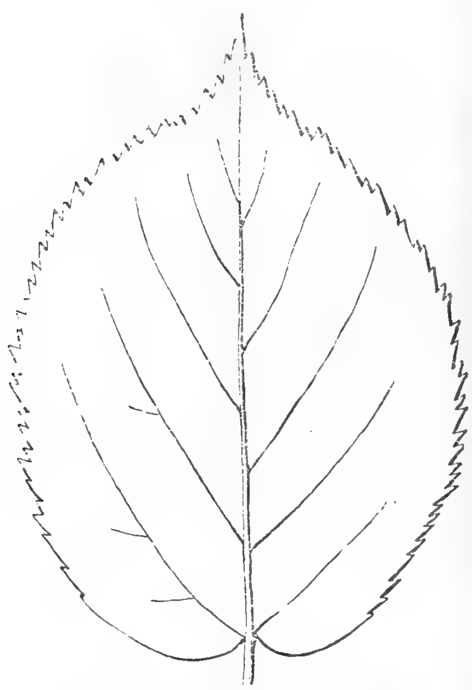


Fig. 168. Leaflet of *R. nitidus.*

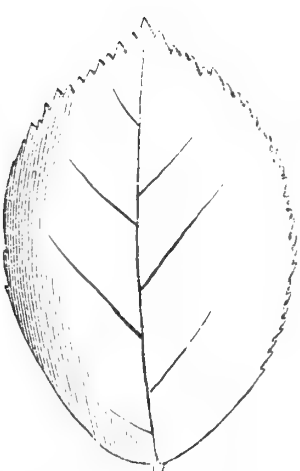


Fig. 169. Ditto of *R. discolor.*

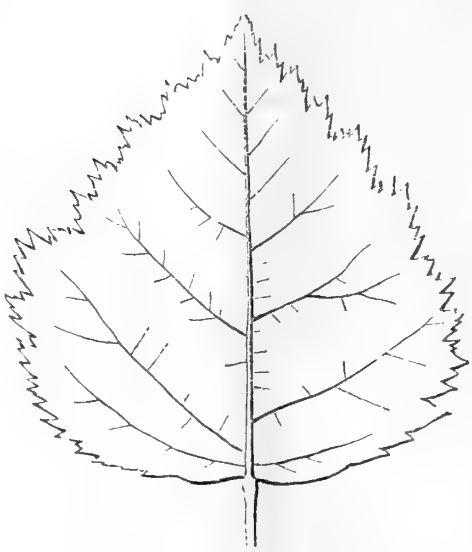


Fig. 170. Leaf of *R. cæsius.*

b. Transition of prickles into aciculæ, setæ, and hairs, gradual. Type, *R. Kœhleri.*—Stems trailing, terete; abundantly furnished with prickles aciculæ, setæ, and hairs of unequal lengths: this bramble is not very common; at any rate, we have only gathered it in Broxbourne woods: the prickles are slender and patent; the leaflets obovate, coarsely dentate, and scarcely acuminate; somewhat cuneate; pale green beneath and hairy on the veins; panicle, with short leafy corymbose branches; sepals ovate, attenuated, and reflexed from the fruit; petals white, obovate. *R. fusco-ater* differs considerably from the preceding plant: it occurs sparingly on Harrow Weald Common, and is equally unfrequent. The stems are dark purple, bluntly angular, and prickles declining; the leaves ovate acuminate, the basal ones oval; the toothing of the margins subpatent on the stem leaves, finely serrate on those of the flowering branches; leaflets coriaceous, rugose, dull green above, paler below; the panicle long, leafy, narrow, with very short few-flowered branches; rachis wavy; petals pinkish, obovate; sepals ovate acuminate, reflexed; thickly beset with dark purple setæ. *R. nemorosus,* or *dumetorum* (*diversifolius* of the London Catalogue), is a form of *corylifolius* intermediate with this section and the *cæsii.* The leaves are variable, of the same character as regards imbrication, but the stems, and especially the rachis pedicels and sepals, are abundantly furnished with setæ; the petals, however, are obovate and not contiguous; not narrow, as in *R. glandulosus;* and the sepals not furnished with a long acumen, as in that species. It is also of frequent occurrence in hedges.

(*To be continued.*)

THE LAND AND FRESHWATER SHELLS OF TASMANIA.

By W. F. Petterd.

ALTHOUGH the descriptions of many species of the Conchological Fauna of Tasmania have appeared scattered through various scientific publications, I do not think a brief and condensed sketch of what is up to the present known concerning the land and freshwater shells of this island will be altogether an unacceptable contribution to the columns of Science-Gossip, for I feel assured it must number many among its readers that take an interest in Conchology. My design in writing the present paper is not to enter into elaborate and exhaustive details of the description and distribution of the various species, but to give a general idea of the land and freshwater shells of this far-off land. Tasmania is situated about 120 miles south of the south-eastern corner of the Australian continent; it is 165 miles average length and 155 average breadth, and, exclusive of adjacent small and numerous islands and indentations, has about 700 miles of a coast-line

of diversified aspect, often rugged in the extreme, their beautiful snow-white sands stretching for miles. It is watered by numerous streams, which meander through its wild mountain-ranges and undulating hills that intersect the island, mostly covered with dense vegetation of gigantic trees and almost impenetrable undergrowth. These natural barriers and the physical character of the island, by dividing it into districts, may to some extent account for the extremely restricted localization of many of the species of land and freshwater shells, which is very marked and noticeable to the conchologist, although the dispersion of animal life in the other departments of zoology is not so generally restricted. The marine species have received much attention, and the richness of the Tasmanian coasts is well known among the lovers of nature, comprising, among its numerous members, some of the most gorgeous and attractive of the collector's cabinet. Among the number may be mentioned *Cypræaovula umbilicata*, *Voluta fusiformis*, *V. manulla*, *V. papillosa*, *V. Sclateri*, and *V. Augasi*, with the beautiful *Venus lamellata*, *Tryonia margaritifera*, *Phasianella Australis*, and many others of equally attractive appearance.

Recently many new species have been described in the Proceedings of the Royal Society of Tasmania, mostly from dredging operations on the coast, comprising species of genera hitherto unrecorded from this island, and some even from Australia. They include new species of *Murex*, *Trophon*, *Ranella*, *Siphonalia*, *Dentalium*, *Gibbula*, *Cyclostrema*, *Scissurella*, *Marginella*, *Conus*, *Pleurotoma*, *Columbella*, *Conionella*, *Styloptygma*, *Stylifer*, *Rissoa*, *Mytilus*, *Gouldia*, *Kellia*, *Macroschisma*, *Turbonilla*, *Clanculus*, *Diloma*, *Daphnella*, *Fusus*, *Triforis*, *Natica*, *Crossea*, *Liotia*, *Acmæa*, *Callista*, *Myadora*, *Gasterochæna*, and a new *Astele*, a genus of Swainson's, described by that talented naturalist when in Tasmania, in the Proc. Royal Society of Tasmania for 1854.

The land shells of Tasmania have received a fair share of attention from Australian scientists, and numerous species have been described by Dr. Cox and Mr. Brazier. The former, in his monograph of Australian land shells, enumerates twenty-two species as from Tasmania; the latter gentleman has many descriptions in Proc. Zoological Soc. of London (*vide* Proc. for June, 1870, &c.), and a general catalogue was published by Mr. Legrand, in 1871, of all the sorts known up to that year. Since then several additional have been described in the Proc. Linnean Society of New South Wales, and Proc. Royal Society of Tasmania. The number of described species now known is eighty-seven, distributed in the following genera: *Bulimus* 2; *Vitrina* 2; *Succinea* 2; *Truncatella* 1; and *Helix* 80; and during my last collecting tour in the northern portion of the island I obtained twenty-two additional species, seven Helices, which are as yet undescribed. The Helices are strikingly different from those of the mainland of Australia, although I have collected several undescribed species in Victoria with a somewhat general resemblance to some of the Tasmanian species; nevertheless, the general characteristic difference is very distinct and noticeable. The number of species, more especially of the smaller forms, is surprising, particularly when it is taken into consideration that but a very small portion of the island has been searched for land-shells, for the workers in natural history are extremely few in number. I have never, to my recollection, collected in a fresh locality without finding one or more new species, which is certainly a great stimulus for further investigation in this attractive department of science, so that we may reasonably anticipate a great augmentation in their number as the unsearched localities are worked up.

Among the most remarkable sorts may be mentioned *Helix Launcestonensis*, Reese, a fine large and unique form, of a black colour, with a broad yellow band on the under surface. It is confined to the dense myrtle forests in the north-eastern portion of the island, where it is comparatively plentiful about decaying vegetable *débris*. *Helix lampra*, Pfr., a pretty glossy wild chestnut shell, found generally distributed along the northern coast-line. *Helix lamproides*, Cox, which reaches occasionally the size of *H. Launcestonensis*, and is possibly the *H. bisulcata* of Pfeiffer.

Helix dispar, Brazier, is the only species recorded with a tooth in the interior of the aperture, either from this island or Australia.

Helix vitrinaformis, Cox, a curious form discovered by myself on Mount Wellington, with a peculiar Vitrina-like appearance, and *Helix Weldii*, Tenison Woods (Proc. Royal Soc. of Tasmania, 1877), a very interesting minute shell from Circular Head, as it is the only reversed Helix recorded from Australasia. The majority of the remainder comprise a group of small Helices very different from those of any other part of the world, of which only three species have been ascertained with any certainty to be common both to the mainland and Tasmania; viz., *H. Sydneyensis*, Cox, which is abundant in cellars and such-like places in Sydney, New South Wales; Auckland, New Zealand; and similar localities in Launceston and Hobart Town. It may possibly be the European *H. cellaria*, introduced by some means. *H. Alexandræ*, Cox, which is abundant in gardens about Sydney, New South Wales, and like localities around Hobart Town. This I consider the acclimatized *H. costata* of Europe. The other is *H. Norti*, Cox, which is generally distributed through Southern Australia, and may have been brought over by accident with plants, or by some such means. The identification of this species is somewhat doubtful, for I think, upon careful examination, the Tasmanian specimens will prove to be a distinct species.

Of the Bulimi, *B. Dufresnii*, Leach, is an unique form, distantly represented by *B. Angasianus*, Pfr., in Australia. It is widely distributed, and varies much in general coloration and size. The larger specimens are found in the dense jungle, and the smaller dwarf varieties in the more open and dry parts.

B. Tasmanicus, Pfr., is allied to *B. Kingi*, Gray, of King George's Sound. It is distributed around the northern and eastern coasts, always near the sea, clustering on trees and rocks, almost invariably in considerable abundance.

Vitrina Milligani, Pfr., is one of the finest species of the genus; it is of a beautiful shiny black colour, and is truly the gem of the land shells of the island, for its remarkable colour and size render it very attractive. It represents in Tasmania *H. attramentasia* of Victoria, Australia, and *H. Busbyi* of New Zealand. The animal is of a bright and showy red colour. It is confined to the western portion of the island, where it is tolerably plentiful in the dense fern scrubs, particularly about the Duck River.

V. Verreauxi, Pfr., the only other species, is generally distributed, aud reaches a somewhat large size in favourable localities. I obtained a species in Gibb's-land, Victoria, bearing a close resemblance to this shell.

Like the land species, the fresh-water are very local in their distribution, almost every creek and mountain-stream affording a distinct species. The Rev. J. T. Woods, in a paper read before the Royal Society of Tasmania, enumerated 32 species; that is to say, 28 univalves and 4 bivalves, belonging to the following genera:—*Physa*, 12; *Limnea*, 4; *Bythinea*, 7; *Ancylus*, 2; *Pomiatopsis*, 1; *Planorbis*, 1; *Assiminea*, 1; *Unio*, 1; *Pisidium*, 2; *Cyclas*, 1. More recently he has described a species each of the genera *Valvata* and *Ampullaria*. Mr. Brazier, in the Pro. Linnean Society of New South Wales for 1876, describes two species, which he places in the genus *Amnicola*,—*A. Petterdiana* and *A. Simsoniana*, and he has also described, in the Pro. Zoological Society of London, two species which he assigns to the genus *Paludestrina*.

The *Physa* and *Limnea* are of the ordinary forms, having mostly close representatives in the mainland of Australia; and the same may be said of the remainder, with the exception of two, viz., the Ancylus, *A. Cumingianus*, Bourgingnat, a remarkably fine and pretty species,—in fact, the finest of the genus known up to the present time. It is peculiar to the Upper Derwent River, in the southern portion of the island, and is without doubt the most remarkable and interesting of the fresh-water shells of Tasmania. The other is a small shell, which the Rev. J. T. Woods has placed in the genus *Ampullaria*, to which genus it very doubtfully belongs, for, in all probability, upon close examination of the animal, it will be found to require a sub-genus, if not an entirely new genus, for its reception. The specimens were collected in a creek on the northern coast of the island. Several species still remain undescribed, and no doubt, as further investigation proceeds, many more novelties will be brought to light in this highly interesting portion of natural science; as it is, the number of species now known is great for its comparative small size. Still, much remains to be done before we shall have a complete and exhaustive knowledge of the land and fresh-water shells of Tasmania. Should this short and rough sketch prove of interest to the readers of SCIENCE-GOSSIP, I shall be only too happy to contribute something more concerning the conchology of Australasia.

MICROSCOPY.

AN IMPROVED WAX CELL.—The following plan of mounting in wax is a modification of that suggested by Professor H. L. Smith, of New York (SCIENCE-GOSSIP, December, 1876). To my mind it possesses two great advantages over that of the professor, being cheaper and more easily accomplished. Into the centre of a clean glass slip place one of Pumphrey's vulcanite rings, and into this put a few chips of white wax; then hold the slip over the flame of a spirit-lamp until the wax is melted, and set aside to cool, taking care that the ring does not slide out of position. When well set the wax will be found to have formed a capital cell on the inside of the ring, and to have filled up the angle formed by the outside of the ring and the glass slip. This form is meant essentially for opaque objects, but it can be easily made available for transparent mounts by placing the slide upon the turntable, and with a broad-pointed scalpel turning out the centre of the wax cell. An exceedingly neat opaque mount is made by filling up this central space with asphalte or other black varnish whilst it rests on the turntable. To fix the cover-glass, rub the end of a piece of warm wax round the upper surface of the vulcanite ring, when sufficient will be found to adhere for the purpose; place the cover in position, and pass a heated iron round the edge, and the whole process is complete. In this way a great many objects may be mounted, ready for the cabinet, at a single sitting, which for neatness, durability, and simplicity of construction are unrivalled.—*H. C. Crew, Netherton.*

QUEKETT MICROSCOPICAL CLUB. — The 13th annual meeting of this flourishing society was held at University College on July 26th, Henry Lee, Esq., F.L.S., President, in the chair. The report of the committee briefly reviewed the work of the past year, and congratulated the members upon the continued prosperity of the club in every department of its work. A large number of books had been added to

the library, 185 slides had been presented to the cabinet, the meetings had been well attended, and many valuable and interesting papers had been read. 49 new members had been added to the list during the year, making the present number 562. The treasurer's statement of account was also presented to the meeting, and showed the satisfactory balance in hand of £106. 13s. 5d. The president then delivered the customary annual address, taking for his subject "The commercial application of the microscope," in the course of which many interesting instances were cited to show how the skilful application of the microscope had proved of great value in the settlement of important questions of social and commercial interest. Much good counsel was also given to the members as to the future usefulness of the club, and a well-merited tribute was paid to the honorary secretary, members of the committee, and officers, to whose efficient discharge of their various duties so much of their success was due. Votes of thanks were unanimously passed to the president and officers of the society for their services during the past year, also to the council of University College for continued permission to meet in that building; and an announcement that a donation from the funds of the club of twenty pounds had been voted towards the building fund now being raised for enlarging the college, was received with cheers. Some further interest was also excited by the presentation of a valuable gold watch to Mr. R. T. Lewis, as a mark of appreciation of his services as honorary reporter since 1866. Dr. Harkness, of San Francisco, having been introduced to the meeting as a distinguished foreign visitor, was requested to convey the greeting of the club to the microscopical society of San Francisco, and briefly acknowledged the compliment on behalf of himself and his colleagues. The result of the ballot for officers and council for the ensuing year was as follows :—President, Professor Huxley ; Vice-Presidents, Dr. Matthews, Messrs. Henry Lee, C. Stewart, and T. C. White ; Treasurer, Mr. Gay ; Secretary, Mr. Ingpen ; Foreign Secretary, Dr. M. C. Cooke ; and to fill four vacancies on the committee, Messrs. F. Crisp, A. D. Michael, E. T. Newton, and F. Oxley.

A Theoretical Limit to the Apertures of Microscopical Objectives.—At a recent meeting of the Royal Microscopical Society, Professor Stokes read a paper on the above subject, in which he showed that theoretically a pencil of rays from a radiant in glass (or under equivalent conditions) of 180° could be refracted by a single refraction at a spherical surface so as to present to the second lens a pencil of about 81° free from spherical aberration ; and, while not asserting the possibility of utilising the whole of the pencil of 180° in glass, he thought a very large part of it might be available in a practical construction,—a far larger part than can be used in dry lenses.

ZOOLOGY.

Birds' Eggs in Wrong Nests.—The circumstance mentioned by Mr. Sharpe in the number for July must be very unusual. Last year, on May 9th, I found a blackbird's nest with three blackbird's eggs and a thrush's ; the blackbird was sitting, but I do not know if they were hatched off. In April, 1873, I found a coot's nest near St. Albans with seven coot's eggs and one moorhen's. On going again a few days afterwards I found an eighth coot's egg and a second moorhen's, with the coot sitting on them. These are the only instances I can recollect to have met with of one species of bird laying in another nest, besides the ordinary custom of the cuckoo, during several years' experience of birds'-nesting. Single eggs of various birds, partridges, thrushes, and blackbirds, more especially, are frequently found dropped on the ground, probably either because the bird has not finished its nest in time, or else because its nest has been torn out. In pulling out an old partridge's nest some years ago, from which all the young birds had run (by the way it was, as I should say they usually are, rather elaborately concocted of dead leaves, grass, &c.) ; in the materials I found an egg which had evidently been laid while the nest was in making, and had been covered up so effectually by the lining that it was addled. I have also a redstart's egg which my brother found in a corner of an old tree, between the trunk and a branch, where it had evidently been dropped for lack of a nest. Very probably the starlings not having a nest of their own ready, made use of their neighbour's from the same cause.—*A. F. Griffith, Cambridge.*

Appearance of Papilio Machaon.—On the 25th of June, 1876, the weather was warm and fine. At noon on that day *P. Machaon* made its appearance out of the pupa ; the wings were developing at the time. Another machaon emerged from the pupa just before 8 a.m. on the 25th June 1878 ; its wings were fully developed ; the weather was warm and fine. Both imagos emerged on the same day of the same month in different years. This may be of interest to those who notice the influence of insects. The usual month for its appearance is May.—*R. A. Dent.*

Testacella Haliotoidea I have lately found in considerable abundance in my garden ; they are generally found whilst turning up the ground. The nearest recorded locality I believe to be Taunton, in Somerset. I have some in confinement, and have been watching their habits, which are very interesting. —*H. T. Johnston-Lavis, Stalbridge, Dorset.*

BOTANY.

The Pronunciation of Scientific Names.—Cordially agreeing with the principles laid down by Mr. Charles Browne, I only write once more on this subject with reference to three names mentioned by him

—*Verónica, Clemátis*, and *Gladiólus*. Not presuming to give an opinion as to the origin of the legend and name, or name and legend, of the saint who bears a name derived from the Latin *vera* and the Greek *eikon*, I venture to think it highly probable that, as a plant-name, Veronica is simply a corruption of Betonica, and is therefore rightly accentuated on the second syllable. Clemátis is now rapidly giving place to the more natural, as well as the more accurate, Clématis. Gladiólus is no worse than Gladíolus. The probably classical alternative, Gládjolus, does not seem to occur to the ordinary gardener's ear.—*G. S. Boulger*.

Notes on Silene inflata.—Is it commonly known that this widely-distributed plant is di-, if not tri-, morphous? On Wednesday evening, the 12th June, I was forced to seek shelter beneath a tall hedge from one of those not very seasonable storms that were this year so disagreeably characterising this month. Amusing myself by examining various flowers within my reach, I was struck with the apparent fact that there were two well-marked forms of the common Catchfly. In one form the three styles (sometimes 4, sometimes 5) projected fully $\frac{1}{3}$ from the tube of corolla, no stamens being visible. A closer examination showed that the stamens were present, but that their filaments were extremely short, seldom much exceeding the average in length; and, more remarkable still, that the anthers were contabescent, *i.e.*, dry and shrivelled, containing no pollen. In the other form the stamens projected $\frac{1}{3}$, while the styles were rarely visible. On pulling to pieces these flowers, however, the styles were found more or less closely oppressed, and evidently quite immature. Further examination showed that this form was decidedly proterandrous; for, though the stamens successively arrive at maturity, commencing with those on the under side, all the anthers have shed their pollen before the styles are fully grown. At this time they are largely exserted, and have their receptive stigmas widely spreading. I have since passed many hundreds of plants in review, and find these two forms about equally distributed in this district, and wonderfully persistent in the characters mentioned. There does not appear to be any other striking points of difference between them, so far as I can at present determine. The first form is evidently to all intents and purposes always female; the second, first male and then female. I found a very few plants in which the presence of a few *dry anthers* (the rest being perfect) seemed to indicate a transition stage between the two. Fertilization must, I think, be brought about by a small dipterous fly, but *how* is not very clear. Its common name of *Catchfly* is fully justified, as any one may see who will take the trouble to examine a number of plants in the earlier part of the day. Almost every flower will then have a tenant. I applied to Dr. Morton, who informs me that Sir John Lubbock quotes Axell, to the effect that there are three forms, one with stamens only, another with pistils only, and yet a third with both stamens and pistil. This scarcelv agrees with my observations on British specimens. If it be correct with regard to continental species, it is highly interesting as showing that the modification in them has proceeded much further than in ours, and along a somewhat different line, as I can find no tendency to the production of purely male plants in ours.—*J. Hepworth, Rochester*.

Variability of Colour in Hollyhocks.—In the autumn of 1873 I picked up a spike, or rather stem, of a hollyhock, with ripe seeds, which had been thrown on a heap of rubbish where it was customary to dispose of the refuse of neighbouring gardens. It was kept through the winter, and then the seeds on it were sown in a row in which the seeds from the lower part of the spike were sown at one end, those at the upper part at the other end, and the others between them in positions corresponding with those they occupied on the plant. When they had come up I took one, as from the lower part of the spike, and planted by itself, and another from the uppermost part and planted by itself, in perhaps a better situation. These two plants flowered in 1875. The one which grew from a seed produced on the upper part of the parent stem was rather stronger in growth and earlier in flowering than the other, which I attributed to its more favourable situation; for I find that hollyhocks are very much affected by circumstances. This earliest flowering plant had blossoms of a crimson red, those of the other were of a much darker colour. The plant with crimson blossoms was the one from which I took the seed which I sowed in 1876, putting in the ground the seeds from each flower separately as well as I could,—though I cannot be perfectly sure there was no error, as a few seeds fell out of their places on the ground. The plants, however, which came up in irregular places I destroyed, that I might ensure as much accuracy as possible. I had expected a difference in habit among plants raised from seeds proceeding from different parts of the inflorescence, but did not think of colour. Of two plants from seeds at the bottom of the spike, one was left on the seed-bed, where it is now alive, having made no attempt to flower. This seems to show the necessity for planting out seedling hollyhocks in order to their becoming vigorous. The other which I planted out in 1877, flowered, as did also four plants from seeds taken from a lateral spike which sprung from the same stem. The seedling plant from the spike of the main stem produced crimson flowers, like those of its parent; the plants from seeds on the lateral spike were white, with only so much of a reddish tint as to indicate their parentage. Not having much ground at my disposal, I did not take heed of the seedlings from the middle of the spike, but planted out nine grown from the seeds yielded by one of the uppermost flowers. Seeds from the uppermost flowers of all, which were hardly ripened, ger-

minated, but the plants had not vital force enough to live through the summer. The nine which I transplanted did not flower till this year, and they have not all flowered now. Three of them are like the one from the lower part of the spike one is much darker, and with many a blossom, having six petals. The plants from the lateral spike having all white flowers, that those from the main spike should present this richer colour, is what I did not expect. I suppose the variability displayed in this instance may be dependent on the fact that the parent plant from which the seeds were gathered was itself derived from a seed on the upper part of a stem. But there is one plant whose flowers are yet unopened; and from what I can make out by examining the bud, it seems as if its flowers would be white. This is so inexplicable as to make me examine my memory as to the possibility of errors, but I trust you will believe me that I cannot imagine any source of error as to the seeds being those of the same plant, and so far as I have reason to believe, four plants with crimson flowers, one with rather lighter, two with deeper, richer colour, and one whose blossoms will also spring from seeds proceeding from the same flower. I enclose flowers, the two white being of plants from seeds on the lateral spike, the others from the main spike, the most diverse from one of the upper flowers; the one from the lowest flower undistinguishable from three others.—*John Gibbs.*

How to grow Filmy Ferns.—A writer in *The Garden* gives the following interesting instructions. Any one interested in these most beautiful of ferns may grow them successfully without covering them with bell-glasses or keeping them in warm houses. In confirmation of this we may refer to a houseful of them in the Boxhill Nursery. It is of small dimensions and sunk in the ground, so that the eaves of the roof, which is of octagon shape, are only just above the surface. It is entered by means of rustic steps through a narrow span-roofed house, in which hardy British ferns are growing amongst virgin cork. The inside of the Filmy Fern-house is lined in the first place with old railway sleepers, placed in an upright position, and which support the roof. These are covered with virgin cork, on which are growing various kinds of ferns. The Filmy varieties consist of fine specimens of *Trichomanes. Radicans, Todea Superba, T. Pellucida,* and others are growing in pots or pans placed on a bank raised three feet or so above the ground-floor, and extending all round the house, excepting at the doorway. The side walls are built with rough stones, among which grow club-mosses and small ferns. A canvas shading under the roof is left there summer and winter, but no means are provided for heating the house artificially. Inside it is easily kept damp and close, and under such conditions Filmy Ferns grow remarkably well, both in summer and winter.

Dimorphism in the Rubiaceæ.—Mr. C. B. Clarke, in a paper on this subject read before the Linnæan Society, shows that there are two kinds of dimorphism in the *Rubiaceæ.* The group is known to be largely dimorphic, the variations consisting chiefly in the lengths of the style and stamens. Mr. Clarke's two forms of dimorphism are as follows:—1. Where the point of insertion of the stamens is altered, being situate in one form high above the middle of the corolla tube, and in another form at the base of the corolla tube. 2. Where there are two kinds of fruit, one corresponding to a sessile flower, and another to a peduncled flower.

"Flowers, their Origin, Shapes, Perfumes, and Colours." By J. E. Taylor, F.L.S., &c. A second edition of this work has already been called for, and has just been published. The author has corrected various errors which almost unavoidably creep into a work of this kind, touching as it does on such a multiplicity of subjects. An American edition has also been prepared and sent over. The rapidity with which this book has gone off, whilst gratifying to the author, is a sure token of the widespread interest taken by the public in the leading scientific questions of the day.

Botanical Notes.—*Arum italicum.*—This plant as many of your readers are aware, is much more abundant than *Maculatum* in Jersey, and, I believe, Guernsey. *Orobanche major* and *Linum perenne.*—Can your correspondent, C. Parkinson, inform me if the specimens of *O. major,* "parasitical on ivy," and *Linum perenne,* "in field," noticed in Isle of Wight, have been verified, as the undoubted occurrence of these plants would be interesting?—*G. C. Druce.*

GEOLOGY.

The Physical History of the English Lake-district.—This was the subject of a paper read by Mr. J. Clifton Ward, F.G.S., in which the author traces the physical history of the Lake-district from the commencement of the period when the Skiddaw slate was deposited. To this succeeded the volcanic Borrowdale series, which is followed, after a physical break, by the Coniston Limestone. Between this and the succeeding Silurian deposits there is little, if any, break. Thus, in the Lake-district, the break between Upper and Lower Silurian is physically below the Coniston Limestone, though palæontologically it is above it. The Old Red Sandstone period was one of denudation, which was continued into the Carboniferous period; and perhaps the whole district was actually covered by the sea during the maximum depression of the Lower Carboniferous epoch. Since then it has probably never been submerged, but exposed to continuous subaerial denudation. The physical significance of the Mell Fell (Lower Carboniferous) conglomerates received special

attention. The author then, from consideration of the amount of deposition and rate of denudation, attempts to estimate the period which has elapsed since the commencement of the record, and sets it down as 62,000,000 of years. The author then considers the age of the Skiddaw slates. From lithological resemblances he is led to correlate the Skiddaw grit with the basement grit in the Welsh Arenig series, and thus to regard the beds below the grit as the equivalent of the Tremadoc, and perhaps of part of the Lingula Flags. The palæontological evidence for the correspondence of the Arenig series with the whole of the Skiddaw slates rests chiefly on Graptolites and Trilobites. The author holds that the evidence from the former is inconclusive, and that from the latter to some extent contradictory, so that the physical evidence can in no way be overridden by it.

STROMATOPORA AND LOFTUSIA. — Principal Dawson has contributed a statement of his views as to the nature of these problematical fossils from the palæozoic rocks, which are commonly known as *Stromatopora.* They are massive fossils, often showing concentric structures when weathered, and have been referred by different writers to the corals, to the Hydroida as allied to *Hydractinia*, and to the Foraminifera. Principal Dawson says that *Stromatopora* is "a calcareous, non-spicular body, composed of continuous concentric porous laminæ, thickened with supplemental deposit, and connected by vertical pillars, most of which are solid"; and he maintains his old opinion, that "*Stromatopora* is a foraminiferal organism and the palæozoic representative of the Laurentian *Eozoon.*"

NORWICH GEOLOGICAL SOCIETY.—We have received Part I. of the "Proceedings" of this old-established society, containing a list of all the papers read before the society since its foundation in 1864, and abstract of papers read during the recent session.

ANCIENT MAN.—Mr. Thomas Belt, F.G.S., the well-known naturalist, has made the interesting discovery of a human skull in the section of a railway cutting in the neighbourhood of Denver, Colorado. The skull was imbedded in perfectly undisturbed ground, at about three feet and a half from the surface. Neither the lower jaw nor any other bones were found with the skull.

FOSSIL SAURIANS FROM THE CAPE.—Mr. Thomas Bain, F.G.S., the well-known African traveller and geologist, has just sent home a splendid collection of fossil Saurians, many of which are new to science, and which have been found in the carboniferous and triassic formations of Cape Colony. They include skulls and other remains of *Dicynodon*, *Galeosaurus*, *Cynodracon*, *Oudenodon*, &c.

THE CORALLINE CRAG.—Dr. Gwyn Jeffreys, in a communication to the Linnæan Society, on some shells dredged in the Korean straits, said that of fourteen species enumerated, six are now, for the first time, found living in the North Pacific as well as the Atlantic. *Micinella ovalis* and *Kellia pumila*, which had been supposed to be extinct, are shown to be living in the Korean region. No fewer than nine of the above fourteen species are Coralline crag fossils. Dr. Jeffreys holds that these facts support his view, that Mollusca common to the North Atlantic and North Pacific Oceans may have originated in high northern latitudes and have found their way to Japan on the one side and Europe on the other, by means of the bifurcation of the great Arctic current.

OUR WATER SUPPLIES.—Mr. De Rance has recently read a paper, "On the Palæozoic and Secondary Rocks of England as a Source of Water Supply for Towns and Districts," before the Manchester Geological Society. The paper contains much useful information on a subject growing every year more important, inasmuch as the demand for water increases, while springs and rivers do not increase. Instances are given which show how vast are the underground stores of water within the region occupied by the rocks above-named. A spring at Barrow-in-Furness yields, from a depth of two hundred and fifty feet, thirteen thousand five hundred gallons of water daily. Nearly three million gallons a day are pumped from a single well at Liverpool. Three-fourths of the seven million five hundred thousand gallons supplied daily to Birmingham is got from wells in the New Red Sandstone, and the water is described as of a uniformly excellent quality, and the Perry Well as one of the best waters for dietetic and domestic purposes ever inspected. Kidderminster has deep wells, one of which gives one hundred thousand gallons a day, and yet the present domestic supply is entirely derived from dangerously polluted shallow wells and streams.

NOTES AND QUERIES.

DOUBLE EGG.—Last year a friend brought me two hen's-eggs which were joined together in a very curious manner. The shell was continued at the apices in the form of a tube connecting the two eggs, about ¼ in. long and ⅛ in. thick. It formed apparently a perfect communication, being filled with albumen. The eggs had the appearance of leaning one against the other, one being quite depressed where the other came in contact with it, which was about a quarter of an inch below the points of junction. I may mention that the shells of the eggs were very imperfect, being almost soft in some places.—*G. M. Doe, Torrington.*

FUNGUS ON FLIES.—I have seen a somewhat similar instance to that mentioned by Mr. E. Wheeler, but with this difference, that the flies so affected seemed to be confined to one particular plant. The plant was withered and dried, and the flies (several dozens) were stuck about it in all directions, and in very natural attitudes. I was not at that time botanist or dipterist enough to identify either the plant or the insects, but the latter were very similar in appearance

to the Yellow Dung-fly (*S. stercorarius*). They appeared to be all of one species.—*W. H. Warner, Standlake.*

BOOK ON DRAGON-FLIES, &c.—Can any reader of SCIENCE-GOSSIP inform me of a work on the British *Libellulæ* (or Dragon-flies) giving plain and satisfactory descriptions of each species? The price must be moderate. Also of a similar work on the British Ants.—*W. H. Warner.*

BEES AND PAINT.—In answer to Mr. Smith's query on this point I must confess my utter inability to assign any probable cause for his bees' apparent fondness for paint—my sole reason for replying to his question being to draw attention to another curious *penchant* of bees, viz., their partiality for smoke. In early spring, when engaged in gardening operations, I have often noticed the few bees out at that time hovering about the weed fires, and endeavouring to penetrate into them, even when the thick dense smoke has been issuing in volumes from the fires. This proceeding has often puzzled me exceedingly. The genial warmth given out by the fires is doubtless the attraction.—*W. H. Warner, Standlake.*

CUCKOO (*Cuculus canorus.*)—Towards the middle of July I caught in the garden (within two miles of the centre of Birmingham) a young cuckoo. It flew into the greenhouse, and was there caught. I suppose that the bird was enticed by the great quantity of magpie moths with which the kitchen-garden swarmed, so much so that (much as I disapprove of killing creatures uselessly) I destroyed over fifty caterpillars in twenty minutes, and have caught in a net almost as many perfect insects in the same time. As I have never seen a cuckoo similar to this one before I give below measurements and general description:—Extreme length from tip of bill to end of tail, $11\frac{1}{4}$ inches; length of wing, $9\frac{1}{2}$ inches; spread, 20 inches; third primary, $7\frac{1}{4}$ inches; tarsus, $\frac{7}{8}$ inch; and tibia, $1\frac{1}{2}$ inches. The plumage was dark iron-grey, except primaries and secondaries, which were of usual colour barred with "rufus." The barrings of throat as in the adult bird, but with a great tendency to very dark brownish-grey, so as to appear at a little distance to be almost black. Tail, greyish-black, with "rufus" markings on inner webs. Iris, dark hazel-brown; cere, very light lemon-yellow. Upper mandible of bill, hair-brown; lower mandible, lighter brown at tip; suffused with light-yellow gape; and inside of mouth as usual, orange; legs and toes, light lemon-yellow, suffused with pink.—*G. T. B.*

DITTANY.—Your June issue contains a request, preferred by Henry F. Bailey, for information respecting "the name of the species of *Dittany*." It is an American plant, and is described in Professor Asa Gray's "Manual of Botany." It belongs to the Mint Family (*Labiatæ*). The Common Dittany is *Cunila Mariana.* It blooms, with us, from July to September. Gray affirms that the Latin name is of "unknown origin." The Mandrake is also an American plant (*Podophyllum peltatum*). It is a member of the Barberry family (*Berberidaceæ*), and is the well-known *Podophyllum* of the Pharmacopœia, so valuable a specific in complaints of the liver. We read, Genesis xxx. 14, that "Reuben went in the days of wheat harvest, and found *mandrakes* in the field." This, I need scarcely add, is an older quotation than any that can be culled from the works of "our early poets," referred to by Mr. Bailey.—*V. Clementi.*

VANESSA ANTIOPA.—W. R. Morse inserts a query respecting the *Vanessa Antiopa.* This is one of our commonest Butterflies. There is no doubt that *our* specimens have a *yellow* margin to their wings. At the same time Westwood, to whose beautiful work I refer your correspondent, says that the margin of the English specimens is "of a white or *whitish* colour"; also that "the pale margin of the wings varies to deepish *yellow.*" I was under the impression that this handsome butterfly had become extinct in England.—*V. Clementi.*

COLIAS.—The *Colias* mentioned by C. E. B. Hewitt is a very common butterfly in Canada, and may be frequently seen, in large numbers, fluttering over rain-puddles on our roads, or settling on their margin. This pretty butterfly is thus described by the American entomologist, T. W. Harris: "Their wings are yellow, with a black hind border, which in the females is quite broad on the fore wings, and spotted with yellow; the fringes of the wings, the antennæ, and the shanks are red; the fore wings have a small narrow black spot on both sides near the middle; the hind wings have a round orange-coloured spot in the middle of the upper side, which on the under side is replaced by a large and a small silvery spot close together, and surrounded by a rust-coloured ring."—*V. Clementi, Ontario, Canada.*

LAPWINGS (*Vanellus cristatus*).—During the snow-storm in the end of March and beginning of April, the Lapwings, who had returned to their breeding-grounds, were so pressed with hunger, that some entered the very houses in search of food. After the snow had disappeared, the remains of hundreds who had perished were to be seen. It appears they will rather die of starvation than leave their favourite haunts in the breeding season.—*W. S. Fyvie.*

INTELLIGENCE OF A MAGPIE.—Some years ago, when residing at Stowmarket, I was much struck with the intelligence of a Magpie belonging to my next-door neighbour. In a very short time, and without any effort to teach it on the part of any one, it learnt the names of several members of my family, and never misapplied them. This proves that birds, in acquiring human language, connect the object and the word, and do not use the latter at random. The Magpie in question was evil-disposed, and loved to annoy girls by pecking their feet; but on the approach of a man or a boy it scuffled away, uttering most unparliamentary phrases. Its leg having been accidentally broken, it repudiated all surgical aid. It used to sit on the sound foot and hold up the maimed limb, looking at it disconsolately, and pecking at the bandages with continual ejaculations of "D—— it!" and died at last worn to a skeleton.—*J. W. Slater.*

GIGANTIC MULLEIN.—When botanizing on the 15th of August last in Spittlesea Wood, near the place I was gratified by finding an extraordinary specimen of the Great Mullein (*Verbascum thapsus*). It towered up to the height of eight feet and a half, lifting its spike of yellow blossoms above the surrounding undergrowth, which had been cut down about three years ago. The total length of the raceme was three feet six inches, and at the base of it were two small lateral flower spikes, the one about six and the other about eight inches in length. Not far from the spot other specimens were growing, the height of which was five and a half feet, but this appeared quite diminutive by the side of its gigantic fellow. This excessive growth may be accounted for by the humidity of the season and the sheltered position in which it grew. The soil is light gravel, over chalk, with flint.—*J. Saunders, Luton.*

NATURAL HISTORY NOTES FROM IRELAND.—A hen was found in a loft, the flesh eaten and picked off, leaving as perfect a skeleton as could be desired. The feathers were lying about. Rats or mice would have broken the bones. What animal could have done it?——A young black rat was killed at Portmore, Antrim, October, 1877.——The gamekeeper of Mr. Lowry, Pomeroy House, told me, within the last two years he has caught, in traps set for rabbits, two wild cats. I questioned him respecting them, in case he might have mistaken them for the domestic cat gone wild, but he stated they were perfectly distinct, having bushy tails like a fox, and dark grey in colour. He could hardly be mistaken, as he is constantly trapping the domestic cat.——The water-vole is found near Pomeroy; the squirrel is also to be found in the neighbouring woods; the water-ousel frequents the streams.—*Sam. Arthur Brenan, clerk.*

RARE BIRDS.—It is with great regret that I read of the slaughter of rare birds, recorded from time to time in SCIENCE GOSSIP and other papers. I am sure no real lover of birds, or true naturalist, would so ruthlessly destroy birds, as they are destroyed, for the sake of their skins, whenever they come to our island. Hardly a season passes but that beautiful bird the Hoopo appears in Berkshire, and I believe it would breed, if it were not so eagerly sought after, and shot.—*J. L. H.*

THE CUCKOO AND WATER-WAGTAIL. — Last August, before 9 a.m., a young cuckoo was observed perched on a croquet-hoop on the lawn, in front of our house, full in view of spectators from the windows. A water-wagtail was busily engaged in feeding it, flying on the hoop each time it fed its strange foster-child. The cuckoo remained for half an hour on the hoop, then flew on to a small rockery near, and from thence to an adjacent railing, the wagtail following it to both places, and continuing to feed it. Both birds afterwards disappeared from sight in a large sycamore-tree. The feeding-time lasted nearly an hour, the wagtail often going some distance in search of food for the cuckoo. Our gardener told us he had noticed before the same birds thus occupied in the early morning, and had also seen a young cuckoo being fed by robins in a similar manner.—*C. M. Baynes.*

A MYSTERIOUS GIFT.—I remember reading in an old book (which also gave an account of the first ascent of the Peter Botte Mountain, near Port Louis) an account of a French creole in Mauritius, who possessed the marvellous faculty of discerning objects far out at sea long before they were visible to the ordinary human eye. His powers were repeatedly tested, and he was officially employed by the governor or merchants there to announce coming ships. He foretold the arrival of the British fleet, which came to take possession of the island, several days before it hove in sight. He stated that he saw these objects upside down (refracted?) on the horizon, and professed to teach his art; but the attempt only proved that he was possessed of some exceptional natural gift, perhaps akin to what the Scotch call "second sight." I was under the impression that the foregoing account was to be found in one of the volumes of Charles Knight's "Useful Knowledge Society's Series"; but as I have failed to discover it there, perhaps some of your older readers can help me. My present purpose is to point out a striking confirmation of the above narrative, which I have recently met with on p. 185 of Boddain-Wheltham's "Pearl of the Pacific." In narrating a visit to the Samoan Archipelago, or Navigators' Islands, he alludes to "a man now living iu Tutuila, I believe," he says, "but who formerly resided near Apia, who possessed the extraordinary power of seeing in the clouds, or in the sky, vessels that were bound for the island. Credible witnesses told me," he continues, "that he had frequently foretold the approach of ships days and days before their arrival, and had accurately described them, their rigging, their build, and the weather they were having—sometimes storm and sometimes calm; reference to the ships' logs on their arrival in port confirming the truth of his statements. He himself attributed his remarkable visions to the state of the atmosphere—a sort of mirage—at a certain point where he took his observations, but I never heard of anybody else witnessing similar phenomena." I thought the concurrence of these totally distinct and independent accounts worthy of your attention, as they may tend to establish the general fact of the existence of a sort of "double sight" in certain gifted individuals, and thus refer the mysterious power of the "seer" to a *physical* rather than a *spiritual* source.—*F. A. Allen.*

A SPIDER'S INSTINCT.—Dr. J. Lawrence-Hamilton writes from 34, Gloucester-terrace, Hyde-park:—"The following incident, which I witnessed, may possibly interest some of your readers:—A boy removed a small spider to place it in the centre of a big spider's web which was hung among foliage, and distant some four feet from the ground. The larger animal soon rushed from its hiding-place, under a leaf, to attack the intruder, who ran up one of the ascending lines by which the web was secured. The big insect gained rapidly upon its desired prey, the smaller creature (spiders are cannibals, notably the larger females, who are given to devour their smaller male lovers). When the little spider was barely an inch in advance of its pursuer, the small spider cut with one of its posterior legs the line behind itself, so that the stronger insect fell to the ground, thus affording time and opportunity for the diminutive spider to escape along the ascending rope of the web. This is not the only fact which seems to indicate that a spider's instinct may almost equal reason."

HOW TO EXTERMINATE MITES.—In answer to "M. R. D.," in the April number of SCIENCE-GOSSIP, as to how to exterminate small mites, I have myself found Keating's Insect Powder quite successful, after having tried other remedies in vain. —*Alfred Paterson.*

REASONING POWER OF DOGS.—I should like to call attention to what I think to be a remarkable instance of reasoning power in a dog (a setter, if I remember rightly). The yard in which this dog is kept at large is separated from a very narrow lane by a wall about five feet in height, from the top of which our four-footed friend is wont to study humanity. On an interesting occasion he loves to leap into the lane; but, when once down, he is unable to jump up again without a long run, and this is apparently rendered impossible by the narrowness of the roadway. The dog, on wishing to re-ascend, begins to trot round and round in the centre of the path, gradually increasing his pace and the diameter of the circle in which he moves, until he is galloping round at full speed, taking a good "kick off" from the stone at each revolution as soon as his orbit extends from wall to wall. When he feels that he has acquired sufficient momentum, he bounds on the top of the wall with ease. I hold that the above performance involves a process of reasoning. Instances of dogs pulling bell-ropes and turning door-handles may result from mere

imitation, but the case in point cannot be thus explained. This dog, having discovered that a rectilineal career was impossible, must have, somehow, hit upon the idea that he could run round the circumference of a circle to any desired distance, and this principle he has applied to the solution of the difficulty in a truly ingenious way.—*C. W. Carrington.*

Clams.—I have noticed for two seasons past "Preserved Clams" in tins, on a Liverpool Trade Circular. I think they are new candidates to gastronomic favour in this country. I take them to be the "Otter" shell (*Lutraria maxima*), found so plentifully on the coasts of Vancouver's Island and British Colombia. *Tridacna gigas* is also known as the "clam," and is, I believe, eaten, but its habits render it difficult to procure in large quantities. The "Otter" shell on the other hand is known to be one of the staple foods of the Indians of the North-West Coast, and J. K. Lord tells us that it is, in fact, a "molluscous cereal," which the squaws dig in summer from the sand and mud-banks of the coast, and dry and smoke in the interior of their dusky wigwams for winter use. I have not tasted the "preserved" clam, and cannot therefore speak of their edible qualities, but Mr. Lord's experience of "smoked" clam does not appear to have been a pleasant one, as he compares it to chewing "good old tarry rope yarn." Are any of your readers able to speak of its worth as an addition to our food stuffs?—*W. A. Cairns, Leominster.*

Preserving Animals.—I, like "W. G.," have met with an article mentioning the method of preserving animals, practised by Mr. Waterton. This article occurs in the *Cornhill Magazine*, January, 1863. It tells what has to be done, but not how to do it. "The tools required hardly deserve the name, for all these wonderful effects are produced with a penknife, a lump of wax, half-a-dozen needles, and three or four wooden skewers. In simple fact, the *modus agendi* is pure modelling, the skin being used as the material, and reduced by art to the plastic state of sculptor's clay, a temporary stuffing being placed within it to keep the skin moderately distended during the progress of its drying." I should be very glad if some one among the many readers of Science-Gossip would give better the directions, or name some work where they may be found.—*W. L. Beaumont.*

Rose-coloured Pastor is not the shelah, a thrush, nor ever will be. It is a starling, and closely allied to our well-known birds. It is a visitor to all parts of the United Kingdom. There is a most interesting account of its visiting and breeding in Italy, in the "Zoologist" for last January. See also Harting's "Handbook of British Birds."—*C. R. Bree, M.D.*

The Opercula of Shells.—Among those who take an interest in the science of Conchology there are many who almost leave out of sight the opercula or lids by which the mouths of many shells are closed. They ought, however, to be noticed, because, according to Gray, the typical form of a shell-fish is the bivalve; and he considers the operculum but as a variation of the other valve. There seems to be some reason for this, because, as we all know, in many bivalves, as in the Oyster, the smaller valve takes very much the place of it; and in that curious shell, the Anomia, it seems hardly needed, and—one step further—in the Limpet it is altogether wanting. There is a curious provision of nature in those cases of *Univalves* in which this lid is wanting; they secrete in very dry weather, and in the winter, what is called an epiphragm, or thin membrane, which covers the opening as a substitute for the operculum. An example of this is to be seen in the common garden snail (*Helix aspersa*). The variety of form among the opercula is very remarkable. In the case of *Cyclostoma elegans*, our only land-shell having this lid, it is nearly circular; that of *Turbo Sarmaticus* has a coralline appearance on the upper side, or, as Woodward calls it, like some of the tufaceous deposits of petrifying wells. Some again are very thin and brittle, as in the Whelk (*Buccinum undatum*), and not at all the same shape as the former, but brown and horny, and in shape an ellipse.—*S.*

Cream-coloured Blackbird. — A cream-coloured Blackbird was shot in Easingwold churchyard some time in March. It is a very fine specimen, and in very good condition. I may also mention that a *cream-coloured mouse* was trapped in a house in this city on the 7th. They are both in the possession of Mr. Ripley, Bird-skiffer, Feasegate, York.—*Percy Thompson, York.*

Poisonous Properties of the Fluid of the "Solanum Dulcamara."—To my certain knowledge, the berries of this plant are injurious to children. I have seen more than one instance of very serious effects having followed the eating of "dead men's cherries," as the fruit of the bitter-sweet or woody nightshade is often called,—effects which would probably have ended sadly had not prompt measures been taken. The children had fortunately in each case eaten sufficient to produce sickness, and this was aided by emetics until all the berries were dislodged. One little fellow had slight convulsions for days, therefore, I have not the slightest doubt on the subject, though Majendie and others state that they would not hesitate to take them, because they are innocuous to animals. "Seeing is believing." The twigs and leaves of the *Solanum Dulcamara* possess medicinal properties.—*H. G. Watney.*

"Sorrel, from the Low German *suur*, sour."

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers. — As we now publish Science-Gossip a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

R. G.—Thanks for the slide. The mounted arachniæ taken from the legs of the House-fly appears to be a species of *Gamasus*, allied to the Beetle-mite (*G. Coleoptratorum*, L.), but another species.

W. H. N.—Your bald-headed sparrow had, perhaps, been in the "wars," a not uncommon occurrence; or it had been affected too considerably by mites.

M. H. Robson (Newcastle-on-Tyne).—The box containing glass tube in which you enclosed a variety of *Hydra*, reached us with the glass smashed to pieces. It should have been posted with a luggage-label attached, on which the address and stamp should have been placed. The blow given when stamping had shattered the glass.

M. J. Wilde.—Your specimens are:—(1) a piece of Trap, with calcite crystals on joint face; (2) fragment of Copper ore (*Cupric sulphite*); (3) piece of Milk-quartz; and (4) portion of water-worn nodule of Flint.

F. Norris.—The plant you sent us is a fine specimen of the Blue Fleabane (*Erigeron acris*).

Anonymous.—We are obliged to call attention to an old rule of ours, which declares that anonymous communications cannot be attended to.

R. G. C.—The insect found on the dog is a well-developed specimen of the Dog-tick (*Ixodes ricinus*). We cannot undertake to answer your latter question without fuller information.

Newquay.—The grass you inclose is the Annual Meadow Grass (*Poa annua*), and the other species intermingled with it is the common Spurrey (*Spergula arvensis*, L.).

F. L. St. A. (Hants).—The shrub labelled No. 1 is a Buckthorn (*Rhamnus Frangula*, L.), and the other specimen is very imperfect, and too small to judge correctly; but we believe it to be *Calamintha Nepeta*. Many thanks for your kind note respecting orchids.

B. M. W. (Treaddow).—We detected only one rust, or cluster, at the margin of one of the leaves, which is undoubtedly *Trichobasis Geranii*, B., but we believe it is attacked by another fungus unknown to us; but it is immature, therefore difficult to decide in its present state.

G. A. H. (Manchester).—It is what we have recognised as *Chara hispida;* however, we confess they are too little studied, and very little seems to be known about this class of plants.

C. H. Bould.—Your plant is the Soap-wort (*Saponaria officinalis*).

W. H. Legge.—We have forwarded your account of "a strange bird" to several first-rate ornithologists for identification, but all, without exception, state they cannot make anything out of it.

G. S. Barnes.—See an account of your peculiar malformation of cabbage-leaf in present number.

E. E. Evans.—Your eggs were completely smashed when they reached us, so that it was impossible to name any of them.

W. E. Richardson.—We have received the Trilobite, which is a fine specimen of *Calymene Blumenbachii.* What you took to be a "fin" is merely the rim of the cephalic shield. The Trilobites being Crustaceans (allied to King-crabs) did not possess "fins."

R. H. N. Browne.—The eggs grouped on the backs of oak-leaves are not those of *Coccus*, but of a species of *Aphis.* Two of them hatched whilst the leaf was under the microscope, so that the aphides were visible.

A. Lury (Southampton).—The white substance you sent us from the bark of a young Scotch fir is *not* a fungus, although it was formerly considered, and even described, as such, under the name of *Psilonia nivea.* It is of animal origin, however, like the "Apple-blight," and formed by an insect, a species of *Cynips*.

E. C.—From your specimens we can only make out the male and female of the common gnat (*Culex pipiens*); except that they are smaller specimens than usual under the microscope, they exhibit all the characters of the common gnat.

S.—It is Mr. Lankester's "Wild Flowers worth Notice" to which we referred.

F. R. S.—Prof. Hull has already published a work on the Geology of Ireland, and another and a fuller work on the same subject by Mr. G. H. Kinahan is about to be published. See papers called "Sketches in the West of Ireland," by Mr. Kinahan, in Science-Gossip for 1873, 1874, and 1876, giving archæology, botany, and geology of the district.

J. Cass.—A potato tuber is only an underground bud; and the monstrosity you sent us is not an unfrequent one, as it consists of pseudo-tubers, or *buds*, forming at the base of the leaf-stalks. We have seen several examples this summer.

J. A. Floyd.—The specimens sent us from Cambridgeshire are of Lower Cretaceous age, but, perhaps, not sueh excellent phosphates as the so-called "coprolite" stones, on account of their containing a large percentage of iron oxide. No. 1 are the teeth of *Spherodus.* 2. Tooth of Saurian, probably *Campylosaurus.* 3. *Ammonites lautus.* 4. Tooth of Saurian. The others are fragments of fossil wood, impressions of *Ammonites*, casts of chambers of *Ammonites*, &c.

EXCHANGES.

To dispose of.—Eleven volumes of the Palæontological Society's publications, viz., for the years 1848 (2), 1849 (2), 1850, 1851, 1852, 1862, 1863, 1864, and 1865; also a Ten Guinea Smith & Beck microscope.—S. J. B., Rectory, Beaconsfield, Bucks.

Well-rooted plants of good varieties of Ferns, blooming Greenhouse Plants (not bedding), and Cacti, in exchange for rare British and foreign Shells, polished Stones, and Fossils.—Address, F. R. E., 82, Abbey-street, Faversham, Kent.

Wanted in exchange for Lepidoptera, or a small hand Printing-press, British Birds' Eggs, side-blown.—R. Crosskey, Castlegate, Lewes.

Well-mounted Slides of Foraminifera (*Lagina*), or Diatom (*Campylodiscus cyp.*), in exchange for good Mounts, not Polariscope.—A. Alletsee, 11, Foley-street, London, W.

Wanted, unmounted, scales of fish, palates of mollusca, spines of star-fish, parts or entire foreign beetles and butterflies, stained anatomical and vegetable preparations, zoophytes, wood sections, sori, mosses, marine algæ, fungi, and micro-geological specimens. Good exchange offered.—Alpha, 16, Brunswick-street, Blackwall, London, E.

Botanical exchanges desired.—Send lists to F. W. E. S., Hadlow, Tunbridge.

Birds' eggs, side-blown. Having collected during late tour, can offer collectors many extreme rarities in exchange.—Sissons, Sharrow, Sheffield.

To American Entomologists.—East Indian, African, and other exotic Butterflies sent in papers in the finest condition and good species for Cocoons of *Cecropia, Luna, Io, Polyphemus,* and *Cynthia.*—William Watkins, 36, Strand, London, W.C.

Offers.—"Lond. Cat.," 7th ed., Nos. 81, 82, 97, 100, 133, 141, 145, 280, 296, 301, 316, 319, 326, 354, 369, 373, 376, 491, 531, 564, 612, 622, 627, 753, 761, 917, 984, 1147, 1160, 1241, 1317, 1447, 1448, 1502, 1577, and many others, in exchange for British Mosses or Flowering Plants. Lists exchanged.—W. E. Green, 24, Triangle, Bristol.

Cerastium holosteoides, Listera cordata, Juncus triglumis, Herniaria subciliata, &c., for 101, 103, 153, 202, 309, 358, 374, 404, 477, 481, 526, 767, 1046, 1082, 1438, 1484, 1507, 1521, &c.—G. C. Druce, Northampton.

For unmounted Scales of Carp, Sole, Perch, Roach, Pike, and Haddock, send unmounted Object to J. Moore, 12, Porchester-street, Birmingham.

Micro-Fungi.—Wanted, unmounted Specimens of the order Æcidiacei, first-class slides or material for good specimens only.—Dr. Marsh, Duke-street, St. Helens.

For mounted *Chelifer muscorum* send a well-mounted Slide (named diatoms particularly wanted), to George Turvill, East Worldham, Alton, Hants.

Wanted.—Set of the Human Eye: Optic nerve, cross and per. sect.; sclerotic coat, sect.; cornea, sect.; retina, sect.; chrysaline capsule; iris; ciliary process; choroid coat, long. and trans. sects.; eyelid, with hair on eyelash. Will give Geological Transparent Slides in exchange.—Address, M. Fowler, 45, Burn-row, Slamannan, N.B.

Mammalian Fossils from the gravel and caves, in exchange for others.—W. G., 10, Newcastle-street, Tuxford, Newark, Notts.

All or part of *Design and Work*, cost 4s. 10d.; *English Mechanic*, 5s.; *Fancier's Gazette*, 6s. 9d., for back numbers of Science-Gossip, or offers.—E. V., 41, Peckham-grove, S.E.

Spines of *Amphidotus cordatus* and Algæ, with Diatoms *in situ*, in exchange for other objects of interest.—J. Wooller, 10, Farm-road, Hove, Brighton.

Anatomical sections, mostly human; lung, heart, liver, &c. Will send some in exchange for any well-mounted objects.—C. P. White, the Priory, Lewisham.

F. atomaria, piniaria, P. rota, and others, in exchange for Moths, Plants, Mosses, or Shells.—R. Renton, Fans, Earlston, N.B.

A large case, containing two well-stuffed Squirrels; also a preserved stuffed Snake (Python), to exchange. Wanted, *side-blown* British Birds' Eggs, Natural History Books, or offers. Correspondence invited, all letters answered.—W. Barrett, Roué, 165, White Ladies'-road, Bristol.

Neatly-finished Slide of Scorpion Fly, mounted whole, offered for good Slide of picked Diatoms, or Diatoms *in situ.*—J. Neville, Wellington-road, Handsworth, Staffordshire.

To Conchologists resident at home, abroad, or in the colonies.—Having Duplicates of nearly a hundred species of the British Land and Fresh-water Shells, including many of the rarer Vertigos, such as *substriata, antivertigo, alpestris, pusilla,* and *angustior.* Will be glad to exchange these for Foreign or Colonial Shells, equally good, either land, fresh-water, or marine, or would exchange foreign duplicates only for the same.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

Good side-blown Specimens of the following Eggs for exchange:—Cormorant, Puffin, Sandwich, Arctic and Common Terns, Dunlin, and Eider Duck. Desiderata: other good Eggs or Lepidoptera. Send offers.—John D. Walker, 21, Holly-avenue, Jesmond, Newcastle-upon-Tyne.

BOOKS, &c., RECEIVED.

"Science pour Tous."
"Land and Water." July.
"Journal of Applied Science." July.
"The Natural History Journal."
"Potter's American Monthly." June.
"American Naturalist." "
"Chambers' Journal." July.
"Ben Brierley's Journal." July.
"Botanische Zeitung."
"Collecting Butterflies and Moths." By Montagu Brown. London: *Bazaar* Office.
Appendix to "Contributions to Natural History." By James Simson.
&c. &c. &c.

Communications received up to 8th ult., from:—S. A. B.—H. T. G.—Prof. B. A. T.—H. W. S. W. B.—G. T.—H. C. C.—T. B.—E. C.—E. W.—V. C.—J. G.—T. G. B.—G. H.—R. H.—C. H. B.—G. T. B.—G. S. B.—W. G. P.—Dr. E. de C.—G. C. D.—E. B. S.—A. F. G.—R. H. N. B.—F. K.—C. P. O.—F. B. N.—F. R. M.—J. W. S.—F. W. E. S.—A. J. R.—J. M.—W. E. G.—W. W.—H. C. C.—R. G. C.—J. C. C.—R. G.—Dr. M.—M. S.—W. H. N.—A. A.—G. C.—C. E. R.—H. E. W.—M. J. W.—R. C.—E. R. F.—S. J. B.—Dr. M.—M. H. R.—J. S.—P. T.—J. D. W.—W. S.—J. N.—F. R. S.—H. L.—J. G. G.—W. L. B.—W. M. C. C. S.—W. B. R.—H. M.—F. H. A.—R. R.—C. P. W.—H. W. T.—J. W.—R. S.—J. W. S.—G. R.—E. V.—J. C.—J. A. F.—G. H. H.—W. G.—M. F.—C. C.—&c. &c.

QUARTZ, AS IT OCCURS IN THE LAKE DISTRICT: ITS STRUCTURE AND ITS HISTORY.

By J. CLIFTON WARD, F.G.S., F.R.M.S., &c.

(*Read at the Annual Meeting of the Cumberland Association for the Advancement of Literature and Science.*)

INTRODUCTION.

THERE are few minerals more widely spread than Quartz, a chemical compound of the two elements, Silicon and Oxygen. Common though this mineral is, however, its study opens out questions of deep interest, and may lead us from the contemplation of a pretty piece of rock-crystal to the consideration of subtle and hidden processes in the formation of the crust of our globe.

1. *Geological Distribution.*—Quartz occurs among our lake-country mountains in several forms, but never as a rock by itself, in thick-bedded masses, as is occasionally the case in other mountain tracts.

VEIN QUARTZ exists under four conditions.

(1.) Constituting the whole thickness of a lode or vein, in which case the latter may be said to be a quartz vein, unless the quartz contains much valuable ore, such as lead or copper, for then it will more frequently be called a lead or copper vein with a quartz veinstone. Some of these quartz veins are of considerable width—many yards,—and run in straight lines, sometimes for several miles, though often broken by faults. That they contain gold in small quantities is certain, and I have in my possession some small grains of this precious metal extracted from a vein of quartz in Borrowdale. It is well known that gold has been mined in Wales for a great many centuries, but it seems not to exist in any of our Cumberland quartz veins in workable quantities, so far as I have been able to judge.

(2.) Instead of being itself a lode or vein, quartz frequently forms strings or courses running in or through a lode formed of various mineral substances. Supposing the lode to be lead-bearing, it often becomes an important question how much of the veinstone may be quartz, and how much calc-spar, barytes, or other minerals; for the quartz is very much harder than most other constituents of veins, and if the ore has to be extracted entirely from such a matrix, the labour is much increased. Nevertheless, sometimes even quartzose vein-stuff is quite crumbling, and, when so, the working is comparatively easy. This is the case with several lead-veins occurring in the Vale of Newlands.

(3.) Quartz, when occurring either as a massive lode or a slender string, is opaque, and generally of a pure white colour; but it occurs, thirdly, in the form of clear transparent crystals, lining the sides of cracks and fissures either in massive quartz or in some other mineral substance. These crystals have the general form of a six-sided prism, terminated by a six-sided pyramid, but owing to variations in the relative size of the several faces, the appearance of the crystals may vary. Sometimes also they are coloured in various tints, due to oxides of iron, manganese, &c., mingled with the oxide of silicon, or silica, as it is more usually called. It will be noticed that the pointed ends of the crystals project away from the sides of the crack or fissure which they line.

(4.) Lastly, vein quartz occurs in indefinite lenticular masses and strings among the strata of many geological formations. Thus, occasionally it may be seen to occur between the planes of bedding of stratified rocks, more frequently, however, traversing those planes in an irregular and stringy manner, and sometimes much developed along the cleavage planes, as may be seen in the Skiddaw Slate between the summit of Hindscarth and Scope End.

QUARTZ AS A ROCK-CONSTITUENT:—

(*a.*) Of Stratified Rocks.

(*b.*) Of Unstratified Rocks and Volcanic Rocks.

(*a.*) *Of Stratified Rocks.*

In the Skiddaw Slates there are many parts,

especially the lower, seen on Whiteside and Grasmoor, which have been produced by sandy or gritty deposits, and the grains of quartz may frequently be distinguished clearly with the naked eye. Again, in a well-marked bed of grit, in the upper part of the Skiddaw series, to be well studied in Great Cockup, north of Skiddaw, in the sides of the southern *breast* of Skiddaw, and notably at Lank Rigg and Latterbarrow, in the south-west of the Lake District, the grains of quartz frequently approach the size of small pebbles. In all these cases the quartz fragments are more or less rounded, showing that they have been rolled in the water, and are formed of white quartz, such as occurs in veins, or such as may be won from the disintegration of granite. Even in the clay-slate proper, the microscope reveals the presence of small grains of quartz amongst the aluminous matter.

In some of the beds of Carboniferous Limestone that wrap round the mountainous tract, quartz occurs both in the form of small pebbles and of curious amorphous masses, very similar to the flint in chalk, but known as chert. In the sandstones, interstratified with the limestone, quartz, in more or less rounded grains, is the chief constituent. In the Penrith sandstone, of younger age than the Carboniferous, the small grains of quartz are specially interesting, because, in some parts of the sandstone, at any rate, each grain shows the form of a doubly-pyramidal crystal, the crystals being of very uniform size, and their form often not a great deal affected by rolling. Whence these little crystalline particles could have been derived, to form the sandstone, is somewhat of a puzzle. Among the Blue Mountains of New South Wales, Darwin observed a similar case, and remarks: "It is difficult to imagine how these crystals can have been formed; one can hardly believe that they were separately precipitated in their present crystallized state. Is it possible that rounded grains of quartz may have been acted on by a fluid corroding their surfaces and depositing on them fresh silica?" The silica in old glass sometimes regains its crystalline structure, as shown by Sir David Brewster in 1840.

Quartz as a Constituent of Unstratified and Volcanic Rocks.

(1.) *Among Granitic and Granitoid Rocks.*—Generally speaking, in true granites, quartz occurs uncrystallized, being the last of the constituent minerals to solidify; it then appears to fill up all the interstices of the other minerals, the felspar and the mica. This is the case with the Skiddaw, Eskdale, and Shap granites in the mass; though sometimes very locally, or in the form of dykes proceeding from the main mass, the disposition of the quartz is not interstitial, but crystalline. This latter mode of occurrence may be well studied in the quartz felsite of St. John, and notably in the Armboth Dyke. In these cases the quartz and some of the felspar have crystallized out in a felsitic base, and the cross sections of the quartz crystals often look nearly square from the unequal development of all the six sides. In the Armboth Quartz Felsite Dyke, the embedded crystals are most clearly seen, and the pyramidal termination of both ends may be well observed.

(2.) *Among intrusive Diorites, Dolerites, &c. (Greenstones).*—I know of no cases of quartz occurring in a crystalline condition in the rocks of the Greenstone class. Nor is quartz generally a conspicuous constituent in any form among such rocks. Microscopic study of the class, however, reveals the very frequent existence of this mineral in small portions among the other constituent minerals. In some cases its presence may be due to deposition subsequent to the first formation of the rock, and such belong to our next group.

(3.) *Quartz as an Accidental Constituent.*—By an accidental constituent is meant one that forms no essential part of the rock, but has been introduced, perhaps, long after that rock was formed or solidified. Its manner of occurrence in these cases clearly shows that the quartz has been deposited from solution,—water containing silica infiltrating through the rock-mass. It thus fills up cavities, and sometimes replaces other minerals dissolved away.

Among the volcanic rocks of the district, quartz is very common in this form. In beds of lava, and sometimes in those of volcanic ash, vesicles or long almond-shaped cavities are generally produced by the escape of vapour and gases from the molten or heated matter, on its first eruption from the volcano. Subsequently, when such lava-beds have been covered up by great thicknesses of overlying strata, the water, which is for ever percolating the crust of our earth, and contains very various mineral substances dissolved in it, deposits these in the cavities and vesicles, and amongst other minerals thus left to fill the vacant spaces quartz is very common, and may often be found filling the same vesicle with the minerals calcite (carbonate of lime) and chlorite. When a large vesicle has been thus filled with quartz, variously coloured and under different physical forms, it sometimes happens that the surrounding rock is subsequently broken up and destroyed, and then the hard kernels of quartz are isolated in the form of agates. Such are the agates of Wallow Crag, Keswick.

(*To be continued.*)

BRAMBLES ABOUT LONDON.—II.

By Dr. E. De Crespigny, Author of "A London Flora."

IV. VILLICAULES.—In this section the aciculæ and setæ disappear: the stems are angular, strong, prickly, and furnished with hairs, which are usually duplicate or fascicled, and spreading; or stellately downy and adpressed; a difference

sufficiently well marked to admit of the species of this section being also subdivided.

a. Villicaules proper; type, *R. Umbrosus* (*Macrophyllus*, var., of some authors).—The stems of this bramble when old, are frequently apparently glabrous, from the hairs being deciduous; the young shoots and flowering branches are, however, always shaggy with spreading pubescence; the leaflets round with a short acumen, moderately thick, smooth, and dull green above, pale and furnished with short hairs beneath; prickles strong, conical, patent; panicle pyramidal, with ascending branches; not unfrequent in copses and shady places: Pinner woods, Putney Heath, Broxbourne woods. *R. villicaulis.*—Stems and general habit similar to the preceding; leaflets thick, obovate, or broadly oval, often cuneiform below; obtuse or mucronate; patently dentated, green above, whitish and velvety beneath veins of the upper leaflets often reddish; panicle compact above, more open below, with ascending branches; petals white, obovate, not contiguous; sepals ovate, with a mucronate point, setose and aciculate; prickles moderately strong and straight; rachis and pedicels frequently remarkably velvety: Broxbourne and Wormley woods. *R. macrophyllus.*—The leaves in this species are large, broadly obovate, thin; panicle elongated, with ascending branches. It is a variable plant, and occurs in the woods about Broxbourne, or intermediate, with the following species:—*R. leucostachys* may be easily recognized by its close-set panicles of pink flowers, with filaments of a still pinker hue; the petals are large, obovate, and contiguous; the stems angular and hairy; leaves soft, dull green, hairy above, and more so beneath, of a roundish or obovate form; those of the upper part of the young stem and of the flowering branches whitish beneath, the rachis is whitish, with a soft tomentum, as are also the pedicels; the calyx is rather dark, hairy, setose, and aciculated.—N.B. In common with all brambles of this subsection, a few setæ are sparsely scattered on the rachis, &c.

b. Tomentosi.—In this group the spreading hairs of the stem, and especially of the rachis, appear in the altered form of adpressed stellate down; type *R. discolor.* This is the bramble of general occurrence in wayside hedges; it is so well known that, except to indicate the chief points in which it differs from others, it is hardly worth while to refer to it. The stem is angular and armed with strong, usually recurved prickles; hoary when young from the stellate down; leaflets quinate below, ternate above; narrowly obovate, small (usually) coriaceous, slightly convex, dull green above, white or grey below, with a close-set felt or tomentum; rachis, pedicels, and calyx felted in the same manner; panicle narrow, with short branches; petals contiguous, obovate, pink; styles more or less deeply tinged with purple, as are also, not unfrequently, entirely or in part, the filaments. *R. thyrsoideus:* less common, but by no means rare. The stems are as stout and strongly angled as are those of *R. discolor*, but the stellate down is less closely adpressed; the leaflets are broader and more acuminate upwards, larger, and not convex; the under-side similarly felted; rachis and calyx both hairy and felted; panicle long, narrow; lower branches many, axillary; petals white. *R. rubeolus* (*Salteri*).—This bramble is the connecting link between the Villicaules and the Nitidi. The stems in this species are nearly terete, reddish; hairs scattered and deciduous; prickles rather strong, declining, straight, not curved; leaflets obovate, or lanceolately acuminate, grey and slightly pubescent below; rachis loosely pubescent; panicle narrowly thyrsoid and prickly; petals pale rose, obovate; contiguous sepals, hairy, aciculate, obovate. It flowers early: gravelly commons,—Barnes, Putney Heath.

V. NITIDI.—Stems thorny, strongly angled, entirely free from hairs, aciculæ, and setæ; but the rachis of the panicle is hairy more or less: type, *R. rhamnifolius* (*cordifolius?*). Arched stems of a lively red colour, angled, and furnished with strong prickles, straight and deflected, sometimes patent; leaves quinate, of a bright green colour, lighter below, ovate, the terminal one cordate, acuminate, or subcuspidate; the basal ones narrowly ovate and strongly directed backwards, finely serrated; petals white or faintly tinged with pink, obovate; styles green. Copses and on the borders of woods, not often in hedges: Hampstead Heath, Putney Heath, Harrow Weald Common. On Barnes Common and elsewhere there is a variety with smaller and more coriaceous leaves; terminal leaflet not cordate; a smaller and more compact panicle and smaller flowers of a pale blush colour. This is certainly *R. rhamnifolius* proper; *R. Lindleyanus* (*nitidus*) differs from both in the form of its inflorescence, which is corymbose somewhat, with short patent branches below, and not pyramidal. It has shining bright red stems; shining light-green leaves, whitish underneath, narrower than those of *R. rhamnifolius*, and coarsely and doubly toothed; petals pure white; filaments turning crimson as the flowers fade. It occurs on Harrow Weald Common and Stanmore Heath. *R. incurvatus.*—This bramble, uncommon elsewhere, is plentiful on Putney Heath and on Barnes Common; there are also a few bushes on the lower part of Hampstead Heath. The stems are green, reddish when old, smooth, angled, and furnished like its congeners with rather strong prickles, which are patent on the stems, but decurved on the rachis; the leaflets dark-green and glabrous above and below, deeply and sharply toothed, concave, the margins incurved and wavy; the panicle is narrow, branches short and patent; petals white, obovate; sepals ovate, hairy, greenish. (The peculiarity of the leaves is not seen when they are pressed and dried.)

The foregoing is by no means an exhaustive notice

of the London Rubi. Probably other species and varieties are known to observers; we have several doubtful specimens ourselves, which would, if really out of the common, warrant the inference that much may be done in this field of research. Altogether, the subject is not a very satisfactory one; but some practical gain would result from a determination of the extent to which certain deviations from the characteristics of a definite number of typical forms occur under certain conditions of locality, and whether they are constant in such conditions. The the *nitidi;* and that which is narrowly obovate to the *tomentosi;* but we could do so only in a general sense, because the exceptions in every case would be too frequent. Specific nomenclature, therefore, derived from the form of the leaflets, should be discarded.* The down and pubescence of the stems, on the other hand, are often deciduous: true, these characteristics are frequently apparently wanting, but the lens applied to that portion of a stem which has not been exposed too directly to the sun or vicissitudes of temperature will often reveal its presence

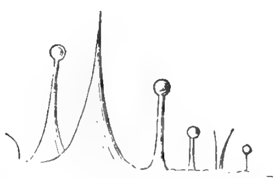


Fig. 171. Prickles, aciculæ, setæ, and hairs of stem of *R. koehleri.*

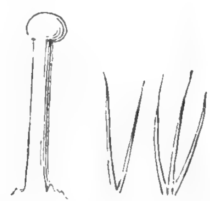


Fig. 172. Setæ and hairs (magnified).

Fig. 177. Adpressed stellate down (mag.).

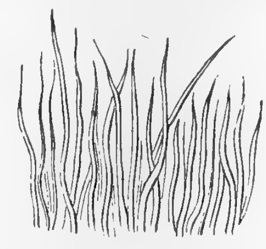


Fig. 178. Spreading fasciculed hairs.

Fig. 173. Prickles, aciculæ, and setæ, of *R. nemorosus.*

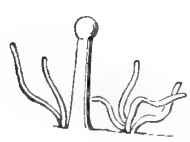


Fig. 174. Gland and tomentum of sepal of *R. discolor* (mag.).

181. Glandular sepals of *R. glandulosus.*

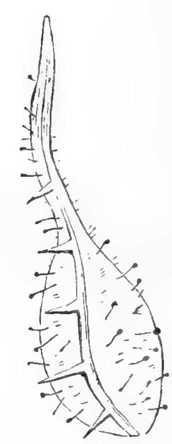


Fig. 182. Glandular sepals of *R. hystrix.*

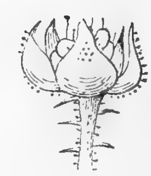


Fig. 180. Flower-bud of *R. nemorosus*, with few-grained fruit, and sepals ascending, often reflexed.

Fig. 179. Hair (mag.).

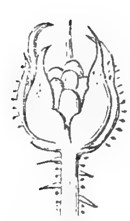


Fig. 175. Sepals of *R. cæsius*, clasping the fruit.

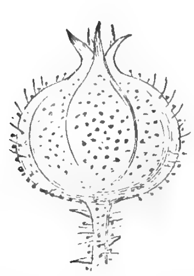


Fig. 176. Flower-bud of *R. fusco-ater.*

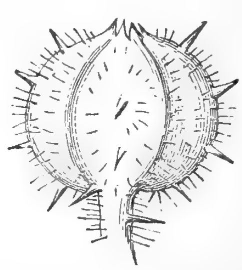


Fig. 183. Flower-bud of *R. umbrosus.*

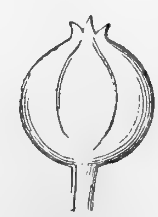


Fig. 184. Flower-bud of *R. discolor.*

characteristic distinctions of the sections above detailed are deduced entirely from the stems; no reliance can be placed upon those derived *entirely* from the leaves, still less from the form of the panicle. This may be racemose, corymbose, pyramidal, or what not; and we may assign the corylose leaf to one section, the oval or elliptical form to the *glandulosi;* the rotund or broadly obovate shape to the *villicaules;** the ovate or obovate acuminate one to in the form of withered shreds interspersed with small black specks, the points of its former attachment.

In September the blackberries are ripe, the right time for gathering specimens as well as fruit; the panicle, the new leaves, and the young or barren stems are then full grown and formed; not that flowering specimens should be dispensed with. The localities from which the fruiting ones and cuttings of the stems have been obtained should be carefully

* No definite idea seems to be attached nowadays to the term "carpinifolius"; formerly it was the general expression for a *villicaulis*, or hairy-stemmed bramble. Specimens so labelled in herbaria seen by us had no resemblance to the typical form of the section whatever, nor to any of the others composing it.

* The terminal leaflet is always more or less different to the others. It may be cordate acuminate while the lateral ones are ovate, and basal oval or elliptical. As for the situation of the prickles, these are on the angles of the stems when these are angled, and rarely elsewhere; their bases are often glandular or hairy as well as the stem itself.

noted and remembered, in order, when July comes round again, to obtain the flowers. Sometimes in a brake three or four species of bramble will be found growing together, their branches intertangled: care must be taken in such cases, when making cuttings, to avoid mistakes; flowering branches should always be taken with sections of the old stem attached, and in making sections of the new stem it should always be so done as to include a leaf. Notes also should be entered in a memorandum-book relative to soil and locality; habit of growth; colour of the leaves, on the upper as well as under-surface; shape and colour of the petals; colour of the styles, filaments, stems, &c.,—points which cannot be determined from dried specimens. Good localities for research are the borders of copses in open upland situations, bushy places in old chalk and gravel pits, shady unfrequented lanes, swampy woods, gravelly commons, and the bushy borders of sandy and peaty heaths.

ON A "TANGLE" DREDGE.

By H. C. C. M.

HAVING spent my holidays for several years past in shore-collecting on the North Welsh coast with considerable success, I determined this

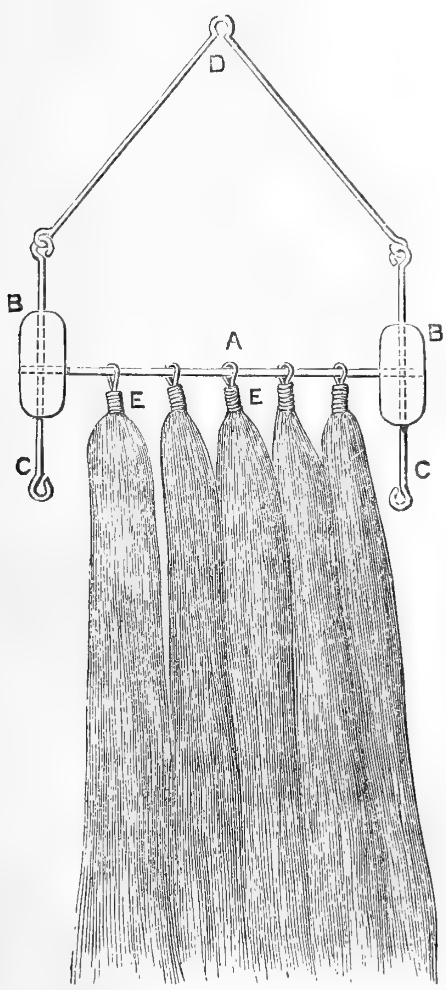


Fig. 185. A New Tangle-dredge.

year to attempt dredging in the Menai Straits. Happening to notice a query in SCIENCE-GOSSIP for March about dredging, I thought I would wait for further communications on the subject before having a dredge made. In the following number of SCIENCE-GOSSIP Mr. E. Lovett, of Croydon, recommends a dredge of hemp "tangles" as being superior in some respects to the ordinary form. Not clearly understanding how Mr. Lovett would construct his dredge, I wrote to him for further particulars, and the construction of the dredge, which I will now attempt to describe, is the result of several suggestions made in his courteous reply. My thanks are also due to David Keid, Esq., of Oldham-street, Manchester, for one or two valuable hints. A, fig. 185, is a piece of brass wire, about the thickness of a lead pencil, and 16 inches long, each end of which is firmly soldered into a boat-shaped piece of lead, BB, 4 inches in length. Lengthwise through each piece of lead a piece of brass wire, CC, about half the thickness of A, and 10 inches long, is fastened, with the ends bent round in the form of a ring. D is a V-shaped piece of brass wire of the same thickness as CC, the two arms of which are each 15 inches long, and the ends are firmly hooked to the rings of CC. To this the towing line is tied. EE are bundles of rope 4 feet long, the strands of which are untwisted, and the fibres pulled out, until they resemble bundles of coarse, rough string. These are firmly tied to the bar A. Fig. 186 shows the bar A and the boat-shaped

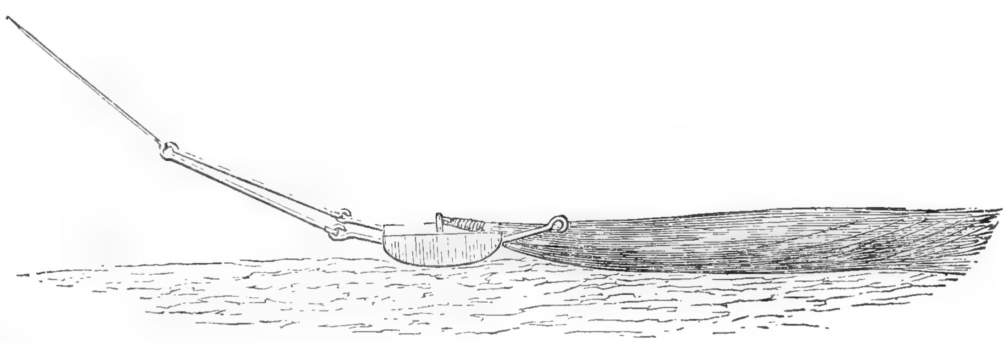


Fig. 186. Diagram showing the Tangle-dredge at work, supported by runners.

"runners" in section, and it will be seen that the bar is bent upwards, to allow of its passage over large specimens without injuring them by its weight. Fig. 187 shows the complete dredge as it appears when travelling over the ground. I found that, in order to make the machine fall to the bottom with the keels of the runners on the ground, it was necessary to have

Fig. 187. Section of Tangle-dredge as it appears when travelling over the ground.

the boat rowed against the current, and to put it into the water in the proper position, allowing it to fall to the bottom very gradually. Although I did not get a large number of specimens, my captures included sponges, sertularians, echinoderms (including some very fine specimens of *O. rosula* and *O. neglecta*),

polyzoons, mollusca, and crustacea, not one of which was injured by the tangles. A pair of scissors were, I found, very useful in removing the specimens. I am afraid that with one exception (the channel between Penmon and Puffin Island) my choice of localities for dredging was unfortunate. One place, about half a mile from Beaumaris pier, in the direction of Puffin Island, was recommended to me by several fishermen as being likely to repay the trouble of dredging, but I was much disappointed with the results of my efforts. However, I feel quite certain that the tangle-dredge will prove to be a useful implement in the hands of marine zoologists, and I shall be glad if some of the readers of SCIENCE-GOSSIP will try it, and record their experience. MANCHESTER.

CANADIAN NATURAL HISTORY NOTES.

I SAW in last October number of SCIENCE-GOSSIP, an advertisement offering specimens of the notorious *Doryphora decem-lineata* for sale at one shilling each. *We* pay for specimens also, but we pay a few cents a pint, or so much a hundred, for them.

I also read, in a recent English newspaper, a report of the mulcting of a labouring man, the fine being likewise, if I remember aright, a shilling, for having a living specimen of that beetle of evil reputation in his possession. If such a law as that brought to bear upon the unhappy rustic were in existence here, it would superadd a large amount to our revenue, inasmuch as few of us are able to dispossess ourselves of such specimens.

It is not, however, my intention, in troubling you with this communication, to treat, at any length, on the Colorado Potato-beetle, for your September number (1877) contains an interesting article on the natural history of that garden pest from Mr. Rye, amply sufficient for your purpose at the present time. I say at the *present* time, for if the insect reaches your shores in any numbers, and if it breeds thereon, you may be glad of hints from those of us who have been overrun by this unconquerable enemy, and who have spent nights in an attempt to devise some plan for its extermination, and days in an endeavour to carry out such plan if regarded as at all feasible.

The beetle is commonly called the Potato-beetle, but it by no means follows that that all-important esculent is alone subject to its attacks. I think it will be found that, under certain circumstances, it is *omnivorous*, and that, at all events, it will not succumb to starvation even where potatoes are not grown, provided other vegetables are at hand.

For instance, where the egg-plant, *Solanum melongena*, is cultivated, my experience induces the belief that the beetle prefers this plant even to the *Solanum tuberosum*. It also attacks, although less ravenously, tomato and pepper plants, and, somewhat singularly, the latter in preference to the former. Inasmuch, however, as these three plants are grown only on a small scale, hand-picking, the most effectual method of removing all insect-pests, can be resorted to ; and therefore the beetles do not, as in the case of potatoes, at the period of hybernation, burrow in their neighbourhood, and, as a further necessary consequence, do not emerge therefrom in the spring.

Where hand-picking, from the large space to be traversed, is impracticable, Paris green is the only panacea ; the powder being mixed with water in a pail and sprinkled over the plants by means of a whisk.

There is, however, a principle of *compensation* pervading nature, which has a tendency to check the ravages of noxious insects. Thus, with the advent of the Potato-beetles into Canada, there appeared, attendant upon their flight, large quantities of lady-birds, the *Coccinella novemnotata*, and others, with the object of preying on their eggs. And it should be noted, lest friends and foes be involved in simultaneous destruction, that the eggs of these two insects are very similar in appearance, being much the same in size and shape, of the same colour (deep orange), and deposited alike on the under-sides of the leaves of the plants on which the insects feed. And now we are told of another enemy of the dreaded beetle,—the *Lydella doryphora*,—to which allusion was recently made at a meeting of the Toronto Entomological Society, by its president, Mr. Brodie, in the following terms :—"It is by far the most reliable and valuable of all the enemies of *D. decem-lineata*."

When the Colorado Beetles make their unwelcome appearance in England—far distant be the day !—I would recommend the enactment of a law for the preservation of rooks ; for, if I mistake not, those *Corvi* will be found most useful coadjutors to children in a potato-patch. These beetles are seen more frequently on the wing in the day-time than any other Coleoptera I am acquainted with, and present a somewhat brilliant appearance in their flight.

It may hap that the English climate will prove too damp, and the soil, in winter, too moist for their comfortable hybernation, but these conditions should not altogether be relied on : they will be upon you in time, just as the Scotch thistles have become an "institution" in the United States, and the English Cabbage Butterfly, *Pieris rapæ*, has become acclimatized in Canada.

By the way, *par parenthèse*, while alluding to migrations, I noticed a communication from A. Wyles, p. 188, respecting some eggs he "obtained in the village of Roundhay, near Leeds," and which he supposes to be those of the Red-winged Starling. He describes the eggs as being of "a greenish grey, streaked with deep yellowish brown." I have none of these eggs by me at present, but Wilson informs

us that they are "of a very pale light blue, marked with faint tinges of light purple, and long straggling lines and dashes of black." The *Sturnus predatorius* is very common with us, and up our lakes hundreds of them may be seen of an evening on the rush-beds, just as I have seen the common starlings in England, where I have killed a dozen or more at a shot.

While submitting my notes on the parasites of the Colorado Beetle, it occurs to me that perhaps a few more instances of the principle of compensation may not prove uninteresting.

We have in Canada a great variety of Ichneumon-flies, from the large *Pimpla lunator*, with its four-inch borer, to the *Ichneumon minutus*, each in its own peculiar way, whether by piercing the living insect, or its egg, doing its providential work in the destruction of hurtful life.

Some time ago my eye was attracted by the eccentric motions of one of the larger steel-blue Ichneumons that was flying round and round a currant-bush in my garden, ever and anon darting at an object which, on approaching it, I found to be a spider in her web. The contest, for such it was, was a long one, and put me in mind of the description of an arena-fight between a *retiarius* and a *secutor*. The latter, on this occasion, was victorious: the *rete* proved an insufficient protection, and the *fuscina*, or ovipositor, was thrust into the victim's body, with what result is well known to naturalists.

On another occasion I saw one of our larger grasshoppers, *Locusta Carolina*, struggling in apparent agony and certain helplessness on the ground. On examination I discovered a small ichneumon, not much larger than a winged ant, upon its body, intent on the insertion of its ovipositor, and although the fly was so much smaller and so much weaker than the unhappy grasshopper, the latter was unable to make use of its powerful legs or its wide expanse of wings as a means of escape.

Another singular parasite, if parasite it may be called, is the Hair Worm, *Gordius*. I once obtained *two* of these Abranchiata from the body of a large spider—a somewhat uncommon *habitat*. These worms were tightly rolled up into small balls of the Gordian-knot type, and were, when unfolded, only about two inches each in length.

At another time I found one of our common crickets, the *Acheta abbreviata*, with a Hair Worm curled around it. Whenever the miserable insect made an effort to release itself from the coils of its tormentor the latter lashed itself into apparent fury, and seemed to paralyze its victim until at length it accomplished its horrible design.

Are these egg-depositing operations painful to the subject? It would be interesting if observers would state their opinions, and give us the results of their observations, on this interesting subject.

Ontario. V. CLEMENTI, B.A.

SOME REMARKS ON HORSE-TAILS.

THE Horse-Tails compose the order *Equisetaceæ*, and this order of Cryptogams is a very interesting one, both as regards the structure of the plants contained in it, and the curious hygrometric movements of their spores.

The stem is underground, and in the spring sends up branches, some of which are barren, while others bear the spores. The branches are hollow, except at the joints, which are numerous; at these points the different segments of the stem are separated by a sort of cellular membrane. Each joint likewise terminates in a sheath, which is membraneous, and embraces the base of the succeeding joint. The branches are fluted, and the sheath at its upper extremity is cut into teeth, the number of which corresponds, or bears some simple proportion, to the flutings on the stem.

These plants are devoid of true leaves; but the latter are represented by branchlets, which are of a green colour, and often assume a verticillate arrangement. A very interesting microscopical object is furnished by the cuticle of the Horse-Tail—the stomata being seen with great clearness under a moderate power. The epidermis is likewise peculiar, on account of the large quantity of silex which it contains; this is so abundant in many species that they have been used by the Dutch housewives for polishing brass.

The most interesting points, however, about these plants is their fructification. All the branches are not fertile, but those that are bear at the terminal extremity a cone-like body, which, on examination, is found to consist of a great number of disks, more or less polygonal in outline, borne in a peltate manner upon a central stalk, by which they are attached to the central axis. On the under surface of these disks the spore-cases are arranged, and these discharge their contents (the spores) by a lateral slit, which looks towards the axis of the plant. The spores themselves are more or less rounded bodies, each provided with two filaments called elaters, and to the contraction and expansion of these the movements of the spores are due. The elaters end in club-shaped extremities. If the end of a branch of Equisetum bearing fructification be shaken gently on to a glass slide, and the latter be then breathed upon, and placed upon the stage of a microscope of low power, the spores will be seen to be undergoing the most curious movements. Some will be quite closed up, the elaters being so closely applied to the spores as to be scarcely distinguishable; others, again, will be seen gradually unfolding the filaments, and a few may be observed to move with a sudden start, as it were, from the contracted state of the elaters to that of full expansion. The ultimate cause of this movement is quite unknown. That it depends upon the

amount of moisture with which the spores are surrounded there can be no doubt. Most probably it takes place by the contraction and expansion of the cells of which the elaters are composed, under the varying influence of the moisture contained in the air. The phenomenon is a very curious one, and should by all means be seen by every one who possesses a microscope.

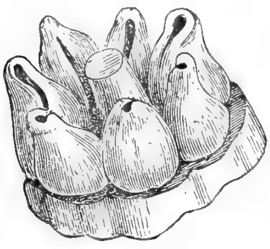


Fig. 188. Sporangium of *Equisetum arvense*.

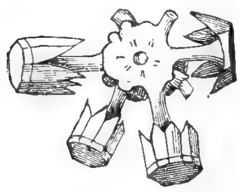


Fig. 189. Transverse section of Fruit-spike of ditto (twice nat. size), showing how sporangia are attached to the axis.

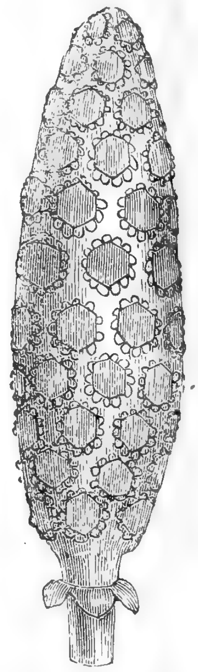


Fig. 190. Fruit spike of ditto, twice nat. size.

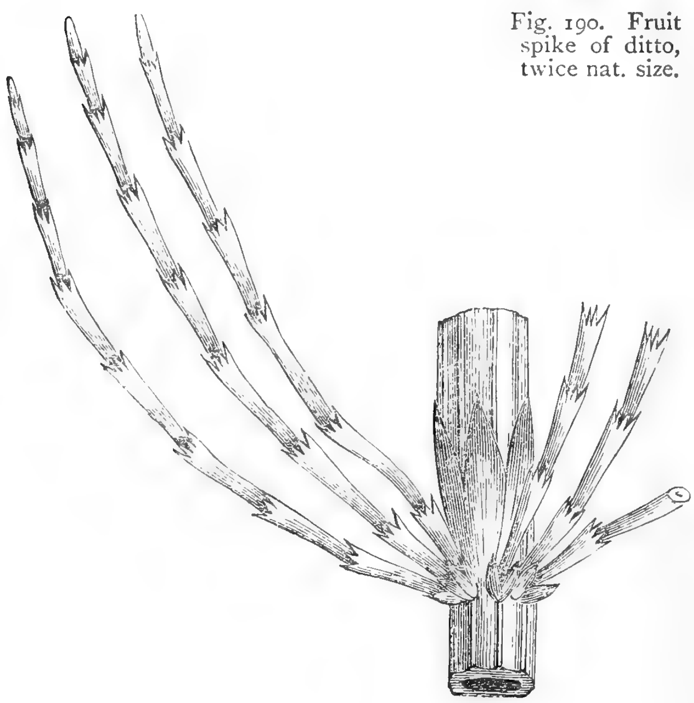


Fig. 191. Fragment of the branched stem of *Equisetum palustre*.

Doubtless the spores are endowed with this susceptibility to hygrometric changes in order to ensure their distribution, and thus the species is continued in distant places. The spore on germination gives origin to a cellular structure called a prothallus, upon which the antheridia and archegonia are borne—much as in Ferns. In former periods of the world's history the Equisetaceæ occupied a much more prominent situation in the vegetable kingdom than they do at present. If we turn to the Palæozoic strata we shall find in the Carboniferous formation of that period abundant evidence of this. The reed-like fossil Calamites most likely belonged to this order, and the vegetation of the Carboniferous period is made up of the genera Lepidodendron, Stigmaria, Sigillaria, &c., belonging to the Lycopodiaceæ, Equisetaceæ, and allied orders.

This order also affords an instance of what has been called *homoplasmy*, or likeness between plants belonging to totally different orders, and even different divisions of the vegetable kingdom. Thus the Equi-

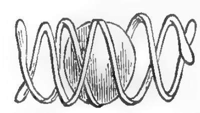


Fig. 192. Spore of *E. arvense*, showing elaters clasped round (mag.).

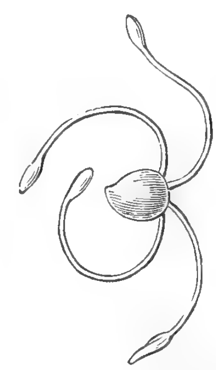


Fig. 193. Spore with four elaters uncoiled (mag.).

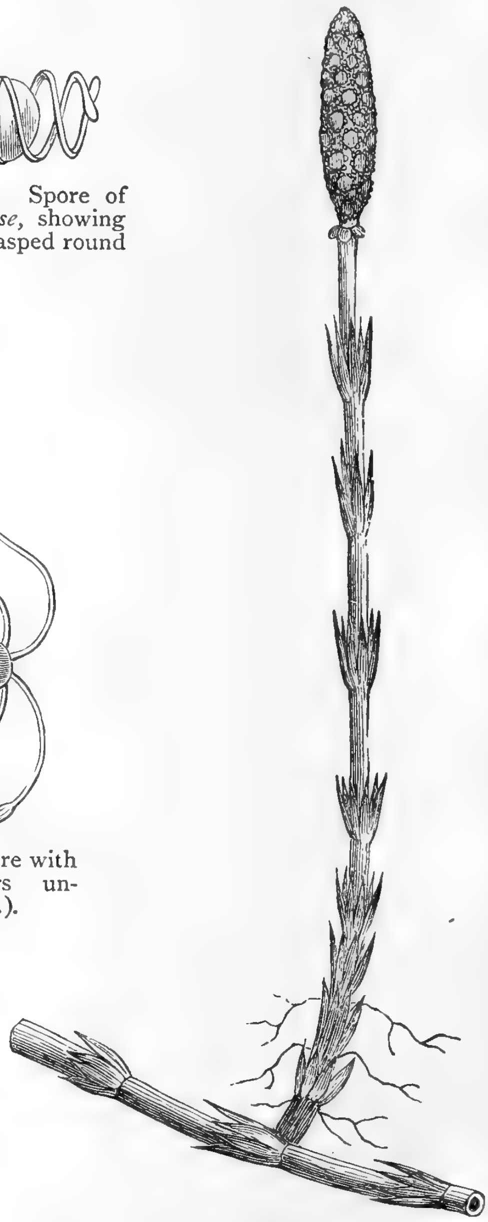


Fig. 194. Fertile stem of *Equisetum arvense*, springing from rhizome (natural size).

setaceæ of the acrogenous sub-kingdom has its counterpart in the Hippurus, or Mare's-Tail, which belongs to the division of flowering plants.

It is often the case that botanical collectors give a great deal of attention to the Ferns and Mosses, and treat with comparative neglect the humble Cryptogams, including the Equisetaceæ. This neglect seems to be unmerited; for, although the flowering plants, doubtless, at first sight, form a more attractive field for the display of the energies of the popular botanist, yet any one who will take the trouble to work at the Equisetaceæ and allied orders, with lens and microscope, will find, in the adaptation of means

to ends and delicacy of structure, quite as beautiful a series of phenomena as is presented by the structure and economy of the flowering plants. H. W. S.

NATURAL HISTORY IN THE SEVENTEENTH CENTURY.

F. KITTON, HON. F.R.M.S.

IN the eighth volume of SCIENCE-GOSSIP we called the attention of our readers to the Bestiary of Philip de Thaun, written in the twelfth century, during the long period that had elapsed between the publication of that treatise and the work I now propose to give some extracts from, we might expect to find a considerable advance in Zoological knowledge. Such, however, is not the fact, not the slightest attempt seems to have been made to verify the descriptions of the early writers, and their accounts of monsters are implicitly believed in.

This book is much more pretentious than the Bestiary, as the following verbatim copy of the title-page will show:—

"The
HISTORY
OF
FOVRE-FOOTED
BEASTES,

Describing the true and lively figure of every Beast with a discourse of *their several Names, Conditions, Kindes, Vertues (both naturall and medicinall),* Countries of their breed, their love and hate to mankinde, and the wonderfull work of God in their Creation, Preservation, and Destruction.

Necessary for all Divines and Students, because the story of every Beast is amplified with Narrations out of Scriptures, Phylosophers, Physicians, and Poets: wherein are declared divers Hyerogliphicks, Emblems, *Epigrams, and other good Histories, collected out of all the Volumes of* CONRADVS, GESNER, *and all other Writers to this present day.* By EDWARD TOPSELL.

LONDON:
Printed by William G. Iaggard.
1607."

The book is a small folio, and contains about 900 pages (including the "Epistle Dedicatory" and index.) It is dedicated

"To
THE REVEREND AND RIGHT
WORSHIPFULL RICHARD NEILE, D. of DIVINITY, Dean of Westminster, Master of the Savoy, *and clearke of the King his most excellent* Majesties closet all felicity, Temporall, *Spirituall, and Eternall.*

The library of English Bookes and Catalogues of writers (Right Worthy and Learned DEAN, my most respected PATRON) have growne to the height not only of a iust-number, but also innumerable: and no maruell, for God himself hath in all ages preserued lerning in the next place to life, for as life is the Ministereall Governor, and moouer in this world, so is learning the Ministeriall Governor, and moouer in life. . . . As life is different, and diuers according to the spirit wherein it is seated, and by which it is norished, as with a current, as also is Learning according to the last vse and practise of rules, Canons, and authors from whan as from a fountaine it taketh both beginning and encrease euen as the spirit of a Serpent is much quicker than the spirit of an Oxe, and the learning of Aristotle and Pliny more lively and lightsome then the knowledge of other obscure Philosophers vnworthy to be named, which either through enuie or Non proficiencye durst-neuer write."

The dedication then proceeds to dilate upon the

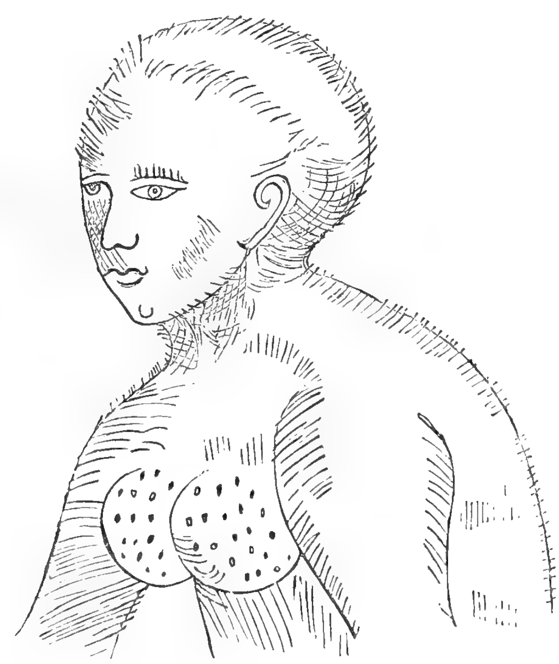


Fig. 195. Sphinga, or Sphinx Ape.

desirability of a knowledge of the history of animals which the writer thinks will tend to make mankind better. "Were not this a good perswasion against murder, to see all beasts so to maintaine their natures that they kill not their owne kind. Who so vnnaturale and vnthankfull to his parents, but by reading how the young Storkes and Wood-peckers do in their olde age feed and nourish them, will not repent and amend his folly and bee more naturale? What man is so void of compassion that hearing of the bounty of the Bone breaker Birde to the young Eagles, will not become more liberale? Where is there such a sluggard and drone that considereth the labours, paines, and travels of the Emmet, Little bee, Field mouse, Squirell, and such others that will not learne for shame to be more industrious and set his fingers to worke! Why should any man living fall to do euill against his conscience, or at the temptation of the Deuill seeing a Lyon will never yeeld. Mori scit unici nescit—and seeing the little

Wren doth fight with an Eagle contending for soueraignty? Would it not make men to reverence a good king set over them by God? Seeing the bees seek out their king if he loose himself, and by a most sagacious smelling sence never cease untill he be found out, and then beare him upon their bodies if he be not able to fly, but if he die all forsake him. And what king is not united to clemency and dehorted from tyranny, seeing the king of the bees hath a sting but never useth the same? . . . . I have followed D. Gesner as neer as I could, I do professe him my author in most of my stories, yet I have gathered vp that which he let fal, and added many pictures and stories as may apeare by conference of both together. In the names of the beasts I have not swarved from him at all. He was a Protestant Physitian (a rare thing to find any Religion in a Physitian) although Saint Luke a Physitian were a writer of the Gospell. . . . .—Your Chaplaine in the Church of Saint Buttolphe, Aldergate, Edward Topsell."

In the "Epistle TO THE LEARNED *Readers*" he gives "the Catalogue of the Authors which have wrote of Beasts," viz., Hebrew, Greek, Latin, German, Italian, French, and the following English writers, Edward Wooton, William Turner, M.D., John Estwyck, John Falconer, M.D., Thomas Bonham, M.D. Thomas Gybson, M.D.

The Rev. E. Topsell adopts a very simple arrangement, viz., an alphabetical one, thus avoiding all the troubles of orders, families, and genera. The first animal he describes is the Antelope. "The Antalope called in Latin Calopus, and of the Grecians Analopos or Aptolos. Of this beast there is no mention made among the auncient writers except Suidas and the Epistle of Alexander to Aristotle, interpreted by Cornelius Nepolius. The vertues of this beast are vnknowne, and therefore Suidas saith an Antalope is but good in part."

The woodcut represents the animal with slightly curved horns conspicuously serrated on the upper margins and a long tooth in the lower jaw.

The next beast described, according to the author's arrangement, is the Ape, of which he remarks that it "is held for subtell, ironical, rediculous, and unprofitable beast, whose flesh is not good for meate as a sheep, neither his backe for burthern as an asses, nor yet commodious to keep house like a dog, but of the Graecians termed *Gelotopioon*, made for laughter.

And as the body of an Ape is ridiculous by reason of an indecent likeness and imitation of man, so is his soul or spirit; for they are kept only in riche men's houses to sport withall, being for that cause easily tamed, following every action he seeth done, even to his owne harm, without discretion."

The female, the writer tells us, "mostly has twins, whereof they loue the one and hate the other; that which they loue they beare in their armes, the other hangs at the dam's back, and for the most part she killeth that which she loueth by pressing it to hard: afterwards she setteth her whole delight upon the other.

The male and female abide with the young one, and if it want anything, the male, with fist and irefull aspect, punisheth the female. When the moone is in the waine they are heauy and sorrowful, but they leap and rejoice at the change, for, as other beasts, so do these feare the defect of the starres and planets. They are full of desimmulations and imitation of man; they readiler folow the euile then the good they see.

They loue conies very tenderly, for in England an old ape (scarse able to goe) did defend conies from the weasell, as Sir Thomas Moore reported. They feare a shel-fish and a snaile very greatly, as appeareth by this history.

In Rome, a certaine boy put a snaile in his hat and came to an Ape, who, as he was accustomed, leaps upon his shoulder and took off his hat to kil lise in his head, but, espying the snaile, it was a wonder to see with what hast the Ape leaped from the boyes' shoulder and in a trembling manner looked backe to see if the snaile followed him.

A Lyon ruleth the beasts of the earth, and a Dolphin the beasts of the sea. When the Dolphin is in age and sicknes, she recovers by eating a sea-ape; and so the Lyon by eating an ape of the earth, and therefore, the Egyptians paint a Lyon eating an Ape to signify a sicke man curing himself. The hart of an ape, sod and dried, whereof the weight of a groat drunk in a draught of stale Hunny sod in water, called *Mellicraton*, strengtheneth the heart, emboldeneth and driveth away the pulse and pusillanimity thereof, sharpeneth ones understanding, and is soueraigne against the falling euill."

The following is a list of Apes described by Topsell:—Vulgar ape, monkey ape, marline ape, callitriche ape, Persian ape, baboun ape, Tartarine ape, satyre ape, monster ape, Norwegian ape, pan ape, sphinx ape, Sagon ape, ape called beare ape, ape called foxe ape. Figures are given of these forms. We need scarcely say that they were in the majority of cases evolved from the artist's inner consciousness. As a specimen, we give a copy of the head of the *Sphinga* or *Sphinx ape*. Of this species the writer gives the following description:—"The *Sphinx*, or *Sphinga*, is of the kind of Apes hauing his body rough like Apes, but his breast, up to his necke, pilde (bald) and smooth without hayre: the face very round, yet sharp and picked, hauing the breasts of a woman, and their fauor or visage much like them."

To the utter confusion of the anti-Darwinites, we quote the following from the history of a Satyre ape, clearly showing the existence of an intermediate form. Topsell's authority for this is unimpeachable, for he says:—"S. Ierom, in the life of Paul the Eremite, reporteth there appeared to S. Antony an *Hippocentaure*, such as the poets describe, and presently he

saw in a rocky valley, adjoining, a litle man hauing croked nostrils, hornes growing out of his forhed, and the neather part of his body had goat's feet: the holy man, not dismayed, taking the shield of faith and the breast-plate of righteousnesse, like a good souldior of Christ, preased toward him, which brought him some fruites of palmes as pledges of his peace, upon which he fed in the iourney, which same *Antony* perceiving, he asked him who he was, and received this answer: I am a mortall creature, one of the inhabitants of this desart, whome the Gentiles (deceued with error) doe worship and call *Fauni*, Satyres, and *Incubi*. I am come in ambassage from our flock, intreating that thou wouldst pray for vs unto the common GOD who came to saue the world: the which words were no sooner ended but he ran away as fast as any foule could fly. And least this should seame false, vnder *Constantine*, at Alexandria, there was such a man to be seene aliue, and was a publike spectacle to all the world, the carcase whereof, after his death, was kept from corruption by heat through salt, and was carried to Antiochia that the Emperor himself might see it."

"Satyres are very seldome seene, and taken with great difficulty, as is before saide, for there were two founde in the woods of Saxony, towards Dacra, in a desart, the female whereof was killed by the darts of the hunters and the biting of dogs; but the male was taken alive, being in the vpper parts like a man, and in the neather parts like a goat, but all hairy throughout: he was brought to be tame, and learned to go vpright, and also to speak some wordes, but with a voice like a goat, and of this kind there are store in Ethiopia."

"*Of the Asse.*—Asses are of very foolish condicions and slender capacity, but yet very tame, not refusing any manner of burthen although it break his back. *Ammonianum* was in such love with an asse, and holding him of so great capacity, that he had one continually to heare his lectures in Phylosophie. *Gallen* affermeth that an ass understandeth, *genus species et individuum;* because, if you shew him a camell that never saw one before, he is terrified and cannot endure his sight; but if he have been accustomed to such a sight, if you shew him never so many he is not moved at them. In like sort hee knoweth men in general, being not affraid of them; but if he see or heare his keeper he knoweth him for his keeper or maister.

The asse being overcome with melancholy humour naturally looketh for the hearbe *Citterach*, or *Fingerferne*, to cure him. The asse is neuer at peace with the cro, because he longeth for the asse's eyes; likewise the bird *Salem*, for when the asse commeth to the thornes to rub himselfe where the same bird buildeth her nest, the asse spoyleth it, wherefore the said bird maketh continual assault vppon him. In like sort the *Colota*, or *Stellio*, for it sleepeth in the mangers, and creepeth up unto the asse's nose to hinder him from eating. The woolfe is also an enemy to the asse, for he loveth his flesh, and with small force doeth he compasse the destruction of an asse; for the blockish asse when he seeth a woolfe layeth his head on his side that so he might not see, thinking that because he seeth not the woolfe the woolfe cannot see him; but the woolfe vpon this advantage setteth vppon the beast on the blind side and easily destroyeth the courageless asse.

Another argument of an asse's stupidity is that he careth not for his own life, but will with quietnesse starve if meal be not laid before him. Wherefore it is apparent that when a dull scholler not apt to learne is bid to sell an asse to signifie his blockishnes, is no vaine sentence; therefore they which resemble asses in their head, round forehead, or great face, are said to be blockish; in their fleshy face, fearfull; in broad or great eies, simple, and like to be mad; in thick lips and the vpper hanging over the nether, fooles; and in their voyce contumelius and disdainfull. . . . The *Iewish* people, who like asses, could not understand the evident truth of Christ in the plaine text of Scripture, wherefore our Saviour secretly vpbraided their dulnes when he rode upon an asse.

Touching such medicinall vertues as have been tried and found to be in the several parts of asses in learned and approved writers, now in this history they shall be briefly remembred, and so this narration finished."

These remedies would occupy more space than the editor would grant me, an example must therefore suffice. "If any be hurt by the starres wash them in asses stale mingled with *Spiknard*, the same force has it against cornes and all hardness or thicknesse of skinne."

"*Of the Indian Asses.*—It is questionable whether the *Monoceros*, commonly called a *Vnicorne*, the *Rhinoceros*, the *Oryx*, and the *Indian* asse be one beast, or diuers; for the Vnicorne and Rhinoceros haue the same things attribvted to them in stories, and differ in verie few reports, both Aristotle, Pliny, and Æhanus coyntly agree that they differ from all other whole-footed beasts, because they haue one horne in the forehead, and so have also the *Rhinoceros*, *Monoceros*, and *Orix*, but the Indians cal a Vnicorne *Cartagono;* and the horne so highly prized at this day is thought to be of the Rhinoceros, but Æhanus and Philes acknowledge no other Vnicorne, but the Indian Asse, who in bignes equalleth a horse among the Indians, being all white on the body, but purple-headed or red (as some say), black eyes, but Volatterranus saith blew, hauing one horne in the forehead, a cubit-and-a-halfe long, whose upper part is red or bay, the middle black, and the neather part white, wherein the kings and mighty men of India vse to drink, adorning it for that purpose with sundry bracelets, precious stones, and works of gold holding for truth that all those which drinken in those hornes

shall be freed from annoyance of incurable diseases, as conuulsions, the falling euile and deadly poisions."

We find two other species of asses described in this veracious history, viz., the Alborach and Axis; the former is, the author says, "the animal whereupon the Turkish priestes and blasphemous idolaters perswade the silly pilgrims of Mecha that Mahomet was carried up to heaven."

Of the Badger, otherwise called a Brocke, a Gray, or a Bauson.—The Rev. E. Topsell most unkindly exposes the ignorance of this animal; he commences his description by saying, "The Badger could neuer find a Greeke name. The Italians call a Badger *Tasso;* the Rhetians, *Tasch;* the French, *Tausson, Taixen, Tusson, Tesson,* and sometimes *Grisart* (for her colour), sometimes *Blareau* (now *Blaireau*), and at Parris *Bedouo;* the Spaniardes, *Tasugo, Texon;* the Germans, *Tachs,* or *Daxs;* the Illyrians, *Gezweez.* Badgers are plentiful in Naples, Sicilly, Lucano, and in the Alpine and Heluitian coasts; so are they also in England. In Italy and Germany they eate grayes flesh, and boil it with peares, which maketh the flesh tast like the flesh of a Porcupine. The flesh is best in September, if it be fat."

(*To be continued.*)

AN EDITOR'S HOLIDAY IN THE WEST OF IRELAND.

ONE of the most bewilderingly lovely drives or walks in the West of Ireland is that from Westport to Cliefden. The distance is something over forty miles, and the road is tolerably good, although in many places chequered by acclivities and declivities. If walking, we should recommend the pedestrian to do the first eighteen miles to Leenane, which is, in our opinion, the most beautiful spot we visited. The road thereto lies over the mountains, and, after gradually ascending three or four miles from Westport, we traverse the surface of a table-land, everywhere boggy and wet, and with pretty loughs or lakes studding its surface. Some of these loughs are very paradises of water-plants, and their margins are covered with the cool green leaves and exquisite white blossoms of the common water-lily. All round this table-land there rises a panorama of hills. Some of them may be called mountains, for they are three thousand feet in height, and their tops stretch upwards into the sky, so that the cloud scenery is mapped and patterned by their presence, and presents quite a different appearance to cloud-land in our own parts of the country. They have a riven and a weird look, these ancient hills, for they are composed of the very hardest rocks known to geologists—namely, the metamorphic rocks. The Silurian sandstones and slates and limestones, most of which once contained fossil remains, have been so completely altered by heat that scarcely a trace now remains of a fossil, and yet their geological map —for this country has been geologically surveyed by some of our ablest men—shows the whole region in a variously coloured pattern which indicates how different is the variety of rocks. The white lines on the map, which represent *faults* or vertical crackings and slippings of the solid rock, are exceedingly numerous. Along the line of some of these faults the valleys now extend, for they have proved the weak places where weathering action could be best exerted. The outlines of these grand old hills have been sculptured by Father Time. They are amongst the oldest of our British mountains, and no country in the world has such ancient mountains as Great Britain and Ireland! For millions of years the storms of different climates have gathered around these ancient peaks, and have spent their fury upon them not in vain, for it is chiefly to the combined and continued action of the weather that their very shapes are now due.

Fig. 196. Terraced Limestone Hills, Glen Colombkill.

From the table-land we have mentioned, a peaty stream called the Erive makes its appearance, at first so small that a boy could jump across it easily. As we pass along the uneven road, the stream gathers strength from its numerous tributaries, all of them after a rainy night seaming the sides of hills like silver threads; and anon it gains in violence and volume and brawls over its rocky bed, which latter widens as well as deepens as the stream descends towards the sea. Here and there it throws its volume of seething water over some rocky terrace as a waterfall or cataract, and occasionally its restlessness seems to be checked by some deep pool which the brown, peaty-coloured water causes to appear of unfathomable depth. Everywhere, however, along the route of the stream, even in these elevated regions, there was growing such a wild luxuriance of that most magnificent of all British and even exotic ferns—the Royal Flowering fern (*Osmunda regalis*)—as we have never before seen, except perhaps once along the

southern side of Barton Broad, in Norfolk. The tall fronds rise to a height of five and six feet, with their brown spore-bearing branches rustling to and fro in the mountain wind. As we passed along the road we saw numbers of ordinary marsh plants, but we were on the outlook for one particular flower which occurs nowhere else in the British Islands, except these western coasts of Ireland. It is one of the heaths, known as St. Dabeoc's (named after an Irish saint), and formerly christened by botanists *Dabeocia polifolia*, although now, in honour of a Scotchman, its generic name has been unmusically changed to that of *Menziesia*. By and by we came in view of this lovely heath. Great was our joy, for we had never seen it before except in the pages of Sowerby. The reader may well pardon the delight of an ardent botanist at the first sight of this plant, growing in luxuriance in its wild abodes, for its beauty is not exceeded even by the magnificent heaths which have been imported into our green-houses from the Cape of Good Hope and Australia. Its rose-coloured, bell-like flowers are about three times the size of those of our English heaths, which latter grow side by side with it, as if for the sake of comparison.

After some miles of tramping, the pedestrian will discover that he has passed the highest point of the water-shed, for the streams are now flowing in a different direction. The mountain scenery becomes grander as he proceeds, the mountains appearing to present themselves one after another like the billows of a stormy sea. At length a glimmer of light appears between the hills where the valley ought to be, and we gradually approach Killery Bay. This is a fiord like Clew Bay, extending from the sea sinuously into this mountain land for a distance of twelve or fifteen miles, the mountains rising in some places quite steeply from the water. Various mountain streams pour themselves into it at the head where the primitive village and capital inn of Leenane is situated. No better spot for the tourist to rest a few days could be selected than this. Along one mountain pass he can proceed to Kylemore Lough, which is, perhaps, the loveliest in Ireland, with the exception of one of the lakes of Killarney, for Kylemore Lough has not only rugged and bare mountains rising around it on every hand, but these are softened down near the margin of the lake by rounded bosses, festooned with honeysuckle, and bramble, and wild rose, the haunt of a thousand plants dear to the botanist, and now bright with three or four species of heath, including an abundance of our prized *Dabeocia.* Shrubberies of hazel bush, willows, alder, and larch come down to the very edge of the water, while above them stand stately groups of Scotch fir, whose rough stems gather all the light that is in the sky and reflect it in the very warmest of colours. Rarely have we been more pleased with a situation than that of Kylemore. At one end stands the magnificent seat of Mr. Mitchell-Henry, M.P. for Galway, who has done good work in the neighbourhood by inducing the peasantry on his estate to drain the bog lands, so that they are being rapidly converted into fertile fields.

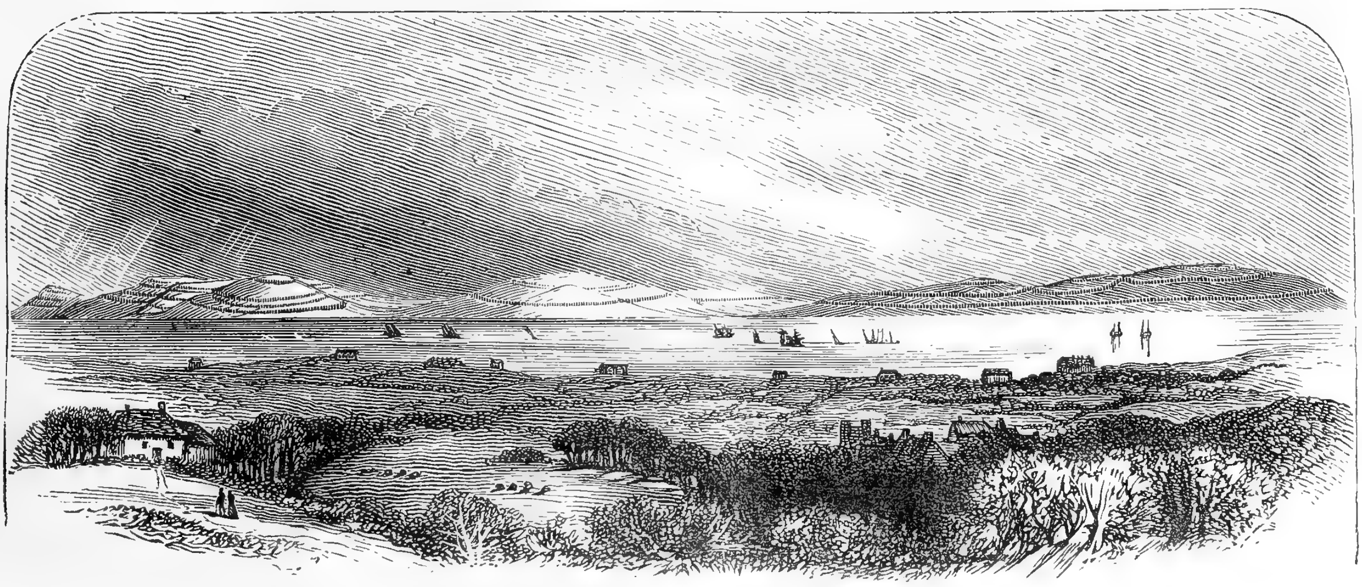


Fig. 197. Distant View of the Terraced Hills of the Burren, as seen from North of Galway Bay.

From Leenane there are beautiful roads to Delphi, through Glen Fee, and to the Pass of Saal Ruck, a walk of about six or seven miles after having crossed Killery Bay. The bay is full of fish, especially mackerel and whiting, and this delicate food can be obtained in almost unlimited quantity. From Leenane to Cliefden is about twenty-four miles, and Kylemore Lough may be taken on the road. Towards Letterfrack we were particularly struck by the signs the landscape presents of the influence which moving ice has exerted in this region. During all our journeyings we had been beset by the strongest evidence of this kind, but nowhere is it more plainly seen than at Letterfrack. Huge hillocks of refuse

are composed of fragments of rocks of almost every size of bigness and smallness, each fragment polished and scratched by the ancient ice-sheet which long ago disappeared. Low rounded bosses of rock, called *roches moutonnée*, had been seen on each side of the road all the way from Westport, many of the latter covered with scorings and *striæ*, all of them converging in the direction of the valleys. There can be little question that, before these bays or fiords were filled with salt water, they had been filled with ice, and had very probably been deepened by the mechanical erosion of the moving ice-sheets towards those deeper and lower parts now covered by the waters of the Atlantic.

Near Letterfrack we came upon some limestones which had been altered by heat until they assumed the appearance of loaf-sugar. Some of the limestones have been coloured green, and the well-known "green marbles" of Connemara are obtained from this deposit. Of them many exquisite ornaments are manufactured and sold at Clifden, the deposit cropping out along the hillsides. A grander country for the geologist, and especially for the physical geologist, could hardly be selected than this, for there are so many varieties of rock formations, particularly of the older and more primitive rocks, that at every few hundred yards the student comes upon a new stratum on which he feels forced to exercise his hammering abilities. Perhaps none of them struck us more than the outcrop of what had once been a Lower Silurian conglomerate, that is to say, a shingle or gravel bed, which had accumulated as such in one of the earliest geological periods. The pebbles of this bed were formed of various kinds of granite, and they had been cemented together in a sandy and clayey kind of matrix, until the entire stratum had become solid. Then this bed had been exposed to the influence of heat and the enormous pressure of overlying masses, so that both the pebbles and the material in which they had been imbedded had been metamorphosed together. No more instructive illustration of the great changes effected upon the configuration of the earth's surface by the agency of heat could have been afforded. The only drawback to the geologist whilst studying these rocks is the absence of a donkey-cart and a good strong donkey, for his knapsack soon gets full and his pockets weighed down, and, worst of all, he is obliged to leave specimens behind him that he would otherwise gladly carry away to gloat over and study during the winter months.

We reached Cliefden late in the evening, when the dusk was falling around us, and the neighbouring hills were gradually shading off into immaterial obscurity. We rose early next morning in order to catch the eight o'clock mail-car for Galway. Punctually to the moment, a lumbering old car, with two Irish horses harnessed thereto, made its appearance at the hotel door, an Irishman perched as if he were on the top of a chimney-pot in front of the machine. The first part of our way led us by the side of the well-known and much-talked-of Twelve Pins or Bens, both the word "Pin" and "Ben" (which is common in Scotland) meaning head or peak in the Celtic language. The names, in this instance, have reference to a group of twelve tall mountains which stand clustered together in the wildest part of Connemara. The road to Galway winds in and out of the valleys formed by and along the base of the mountains, so that we had magnificent mountain scenery on the left-hand side, whilst, on the right, there extend, for miles, a series of lakes like "pearls on a string." Some of these lakes, as, for instance, Lough Inagh and Glenda Lough, are of considerable size, and have islands in their midst upon which are the ruins of many an old castle or keep. At Ballynahinch, in one of the largest of these islands, we behold one of the finest of these castles, that of the Martins, an Irish family which once possessed almost regal power in this part of the country, and owned no fewer than 200,000 acres of land. At Recess there is a capital hotel, much frequented by salmon and trout fishers, their prey being abundant in the lakes and rivers of the neighbourhood. Here, too, the scenery becomes more wooded; but the drive from Recess to a village called Oughterard is one of the wildest and most dismal that it is possible to imagine. We saw it under characteristic conditions. There was a drizzling rain descending from the mountain clouds all the way, and it seemed to bring out the misery and the sloppiness and the bogginess of the low grounds in all their intensity.

As we approach Galway the country becomes more cultivated. The roadsides and walls are perfect paradises of ferns, among which *Scolopendrium vulgare*, *Asplenium trichomanes*, and *Ceterach officinarum*, are most abundant. There are signs of greater wealth, and here and there mansions make their appearance with rich woods around them. Lake Corrib stretches away to the very heart of the Twelve Pins, some forty miles away, and a steamer plies up and down the water during the summer months. At Galway bridge we could see from the parapets the salmon in scores, three or four thick, lying at the bottom of the stream, waiting for the freshets, so that they could pass up the salmon leap and through the loughs into the mountain streams above. A day or two may be agreeably spent in Galway, especially in exploring that outlying suburb called the "Claddagh," where the Spanish settlers of 300 years ago still live apart from their Irish brethren, with a mayor of their own, elected every seven years, and governed by their own unwritten laws (which are obeyed much more strictly than the written laws of the Saxon in Galway town).

We left Galway by the steamer which crosses the bay to Ballyvaughan. The day was intensely hot, and the atmosphere seemed full of light. Hence the white limestone-terraced hills of the Burren would

have been unbearable for one's eye to gaze upon had it not been for the oases of greenery here and there. We think there can be little doubt that these rock-terraces are due to weathering, and that they do not represent successive sea-beaches, as some imagine. The terraces appear to coincide with the outcrop of the limestone beds, and the terraces are most pronounced towards the tops of the hills, the *débris* lying along the bases having greatly protected the lower strata from meteorological erosion. The rainfall hereabout is 54 inches in a year, and as it mostly descends in a fine drizzle, nearly every drop must tell upon the limestone, and its weathering action must therefore be almost complete.

We stayed a few days at Lisdoonvarna, a pleasant green country, richly undulated, where the Yoredale shales abut against the Carboniferous limestones, and the water percolating through the former dissolves away its iron pyrites, so as thus to form "Spas" of notable benefit. Dr. Westropp, the kind and genial physician of the place, has made a remarkable living collection of all the varieties of the Hart's-tongue ferns found growing in the fissures and joints of the Carboniferous limestone near Black-head. These joints are very numerous, and in each of them we saw growing a wonderful luxuriance of Maiden-hair (*A. capillus-veneris*) and other ferns; while on the cliffs the surface was matted with *Dryas octopetala* (still in flower); and patches of *Statice spathulata* grew here and there, close by denser tufts of *Asplenium marinum*. Near Mohr Cliffs we found *Lastrea recurva* completely covering a bank for a short distance. These Cliffs are a magnificent spectacle, rising quite perpendicularly for nearly 600 feet out of the sea. They are formed of Lower Carboniferous rocks, the thin flagstones of which are completely covered with worm or molluscan tracks. We should be delighted to convey to our readers even a faint idea of the pleasure we enjoyed from the detailed exploration of the limestone rock-gardens, surely unknown the whole world elsewhere, and of the loveliness of the green western Irish land, and of its balmy atmosphere, which one can almost taste!

The Carboniferous limestone underlies the whole country hereabout—a land bare, almost as a wooden table, of grass, and yet richly feeding numbers of sheep. The real reason why sheep are able to feed over the limestone tract of the Burren hills, is that the rocks are so much fissured with the vertical cracks, in which grow the loveliest of wild plants, many of them rare to the botanist, and a profusion of such ferns as the Hart's-tongue, the Maiden-hair (*Adiantum capillus-veneris*), the Ceterach, and many others. Various species of grass also grow in these chinks, and it is upon the latter that the sheep browse, and so the spectator is presented with the peculiar appearance of sheep grazing on what appears to be a region of the poorest and the baldest rock.

MICROSCOPY.

"NEW FORMS OF ANIMAL LIFE!!" (*vide Times* report of Sir W. C. Thompson's paper on the official report of the *Challenger* Expedition, August 21, 1878).—"Sir W. Thompson says that Mr. Holdich is illustrating most of the pelagic genera, these plates representing several remarkable forms of 'shizopods,' to which they have given the name of *Challengerida*, as they seem to have hitherto escaped observation. Professor Hatchel is about to publish a splendid memoir of the *Radiolari*. Any one acquainted with Hatchel's classical work, 'Die Radiolariem,' would have some idea of what may be expected of that memoir. Mr. Moseby is at work on a most remarkable little series of coralloid forms of the Hydrogor, which he has named *Hydrocorotmal*, and on their strictures and relations Mr. Moseby's careful work, during the voyage and since their return [query, of the *Hydrocorotmal*?], had thrown quite an unexpected light. Professor Hatchel would describe the *medusæ*. The *Peliatozo* would be described by himself (Sir W. Thompson). About twenty plates were cut stone (these will make a heavy book) illustrating the stalked crinoids. Professor Alexandrac Ligussis was going on rapidly with the *Echiniden*. Mr. Lyman was working at the *Opherxides*, and he expected Mr. Phere, of Upsala, to come over to examine the *Holtheridea*, which he was going to describe under the general superintendence of Professor Lowe." A friend says I am mistaken, these are not new names, and if the following corrections are made it will be all right. For *shizopod* read *rhizopod*, *Radiolariem* read *Radiolarien*, for *Hydrogor* read *Hydrozoa* (I still adhere to it that *Hydrocorotmal* is new), *Opherxides* is the same as *Ophiuridæ*, and *Holtheridæ* is identical with *Holothuridæ*, and Professor Hatchel is vulgarly known as Haeckel.—F. K.

HIGHBURY MICROSCOPICAL SOCIETY.—We are pleased to state that a Highbury Microscopical Society has just been formed under the presidency of Dr. Alabone. Applications for membership should be addressed to the hon. secretary, Mr. R. B. Brindley, 37, Highbury Park, N. The opening meeting of the society will take place on Thursday, October 10th, at Harecourt Hall, St. Paul's Road, Highbury, with an exhibition of objects of a scientific nature, principally shown by the microscope. Tickets free on application.

MEASURING WITH THE MICROSCOPE.—A very simple arrangement for measuring microscopic objects has been invented by Mr. G. J. Burch, and fully described in the "Transactions of the Quekett Club," for July, 1878. It is as follows:—The body of the microscope is placed in a vertical position, and one of the forms of "Beales's" Neutral Tint Camera Lucida, placed as usual over the eyepiece, attached to the tube of the Camera, and at right

angles to it is a light rod, of any convenient length, upon which a graduated scale slides opposite to the thin glass in the Camera. On looking through the latter the object will appear to have the scale laid upon it, and its size can be easily determined. The rod upon which the scale is clamped should be graduated in order that the magnifying power of the objective may be ascertained and registered: this is ascertained in the following manner:—the divisions on the scale are adjusted to those seen on the stage micrometer, and its position noted for future reference. It is necessary the figures on the scale should be reversed. A goniometer scale for the measurement of angles can be easily substituted for the ordinary scale.

THE MINIATURE MICROSCOPE LAMP.—We have recently tried the above-mentioned lamp, just introduced by Messrs. How & Co., St. Bride-street, Ludgate Circus, London, and find that, although very much smaller than those hitherto in use, it affords a pure white light sufficient for all microscopic purposes. One of the advantages of its small size is the much less heat given off, a somewhat important matter, when a dozen or more lamps are burning simultaneously. It is fitted with the Improved "Hailes" shade; this in its original form, as most of our readers are aware, was that of a porcelain cylinder, with an aperture at the lower part, the rest of the light being obscured; it was supported by a brass ring sliding on the upright rod of the lamp. One fault in this form of shade was that a great amount of light was visible above it, and generally on a level with the eye of the observer. In the new shade this has been obviated by the upper part being made dome-shaped, the eyes being thus effectually protected from glare. The shade is supported by a "gallery" just below the burner; it is therefore always in position. The lamp, when not in use, is packed in a japanned tin case, about 3 inches in diameter, and 9 inches in height, and weighs under two pounds.

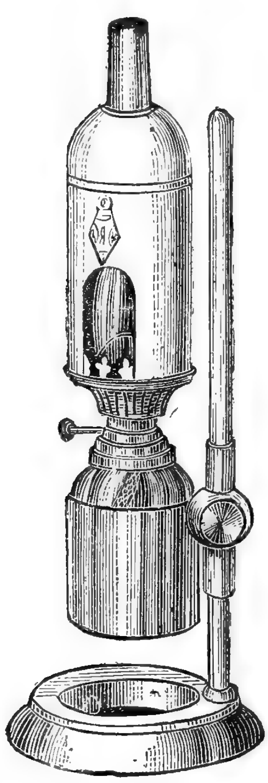


Fig. 198. The Miniature Microscopic Lamp.

THE PAINTED LADY.—Have you ever observed a kind of metallic sound when this insect is on the wing? I also fancy it has a partiality for sandy patches on hedge-banks, especially under the shade of trees. It flies later in the evening than some other species, and is a bold insect—returning to the spot where an attempt has been made to capture it. —*W. M. C. C. S.*

ZOOLOGY.

THE BLACK-THROATED STONECHAT IN LANCASHIRE (*Saxicola stapazina*).—It is a pleasing duty to me to record the taking of a very beautiful specimen of what I consider an exceedingly rare bird in our neighbourhood (*Saxicola stapazina*). The specimen was shot by a friend of mine about the middle of May this year on the margin of the Bury and Radcliffe Reservoir; and, though very mangled with shot, having a goodly number of 6's, it has been very well mounted indeed by my friend Johnson, of Prestwich. Considering the condition it was in from being killed with such large shot, I really doubted at one time whether it could be mounted; however, it has been, and a valuable addition to our list of birds it is. We naturally ask ourselves now, if this bird is no native what is it doing here, and how came it to visit us? The most probable solution to this is, the Stonechat family are migratory, leaving us for more southern and western countries about the beginning or middle of September, returning to us in large flocks about the end of April or beginning of May; and likely enough this specimen, being of the same habits as our Wheatear, has travelled along with a flock and reached our shores, whence he would drive inland in search of a mate. I have sought many works on British birds, but failed to find its mention; and the only description I can find is in Cassell's "Book of Birds," vol. ii., p. 199. The bird I have is a male bird, in fine mature plumage, and in very good condition when shot. Its habits when alive, as noticed by several parties for a few days prior to its being captured, were very active, vigilant, and shy. It seemed to hoid itself aloof from any of the same order (*Saxicola œnanthe*). Cassell's description of these birds in their native home is very interesting, and I here give an extract:—"Though they by no means avoid fruitful tracts or cultivated districts, these birds very decidedly prefer to take up their abode in mountainous or stony regions; and are for this reason particularly numerous in Sweden, Southern Germany, and Switzerland; in the latter country they are popularly known as Mountain Nightingales, from the height to which they often ascend. Even the icy and rugged tracts of Scandinavia and Lapland seem to suit their requirements, and we have often seen them hopping nimbly over the glaciers in situations where no other living objects were discernible. Individuals inhabiting more southern latitudes display the same liking for barren grounds, and are usually seen in localities so sterile and arid as to appear totally incapable of affording them a sufficient supply of the insects upon which they subsist; their disposition is lively, restless, and very unsocial; only during their winter migrations do they seem to commingle with others of their species, even when circumstances compel a certain amount of neighbourship; each bird lives for itself, without appearing to have

the slightest interest in the proceedings of others in the vicinity." In order to more clearly identify this specimen from our Wheatear (*Saxicola œnanthe*), I have had a male specimen of the latter mounted along with it, from which it will be seen there is a very wide difference; the colours of *S. stapazina* are, on the head, nape, and back, white, slightly tinged with rust yellow; on the belly and breast dulled white; the throat and cheeks, from above the eyelids, including the ear-coverts, are jet black, quite as much or more than the Pied Wagtail (*Motacilla Yarellii*); the upper and under tail-coverts are white; the two outer tail feathers on each side are white, slightly edged and tipped with black; while the three next on each side are white, slightly edged (but not tipped) with black, the middle tail feathers are entirely black, the wings are a beautiful glossy black, as are also the legs and toes. I did not take the dimensions of the bird when dead, but it is a trifle smaller than *S. œnanthe*, as will be seen on comparison. I have shown the specimen to several very able naturalists, and not one remembers having seen the species before.—*R. Davenport, Bury, Lanc.*

ANIMAL STUPIDITY.—In studying the intellects of the lower animals it is no less important to note their mental shortcomings than the cases in which they reason correctly. Early this year I observed a singular piece of irrationality on the part of a large black retriever. The animal lived in the last house of a "terrace," in one of the northern suburbs of London, separated from the next terrace by a walled alley. Finding itself one day locked out, and being unable to effect an entrance either by the front door or by a side door leading into the alley, it made its way into the front garden of the end house of the next terrace, and made most persevering but fruitless attempts to leap over the wall. Had it succeeded it would, of course, only have landed in the alley which it could enter from the street. After a short time it left the garden, and ran round into the street and the alley, but still returned again and again to its endeavours to jump the wall until its master came home.—*J. W. Slater.*

CANNIBALISM AMONG CATERPILLARS.—Receiving two half-grown larvæ of the Goat Moth, I put them into a tin box and left them for a short time. On reopening the box I found that one caterpillar had entirely devoured the other except the hard case of the head and a portion of the skin and prolegs. At first sight I thought that the larvæ had assumed the chrysalis state, or had thrown off its skin, but a careful examination failed to discover the chrysalis, and the box was too securely fastened to allow of the caterpillar's escape; so the conclusion that one larva had devoured the other was the only one I could satisfactorily come at.—*C. C.*

PARASITE OF THE LINNET.—I am induced to write the few following remarks to SCIENCE-GOSSIP under the belief that this parasite is not well known. I shall be glad to hear if any subscriber has a similar specimen. Figure 199 shows this parasite magnified 50 diameters, and figure 200 shows one foot magnified 280 diameters. It is evidently a *Physostomum* and not unlike *Physostomum mystax*, said by Mr. Denny

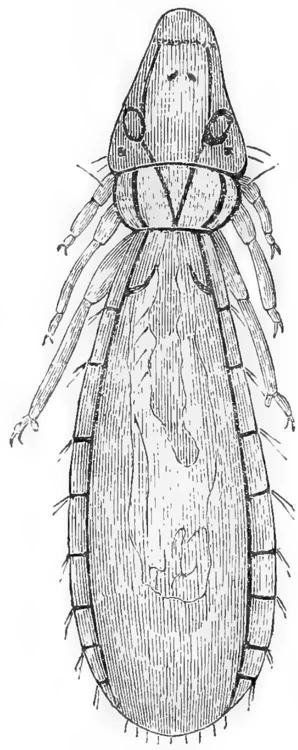


Fig. 199. Parasite of Linnet ×50.

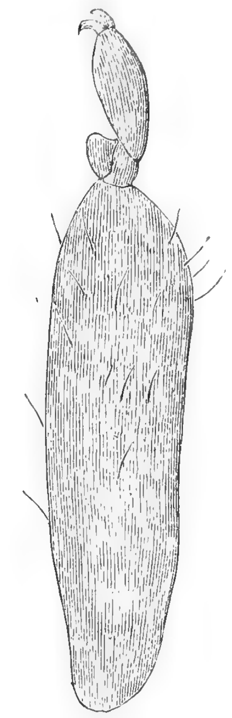


Fig. 200. Foot of Parasite of Linnet ×280.

to infest the chaffinch. The head is large and devoid of antennæ and trabeculæ. The legs are long, the femora thick, the first joint of the tarsus has a pulvellus. The mesothorax is wanting and the metathorax is continuous with the abdomen, which consists of 9 segments. The colour of this parasite is brownish yellow with a dark band down each side. It can move with great rapidity among the feathers of its host.—*W. A. Hyslop.*

THE COLORADO POTATO-BEETLE.—The appearance of the Colorado Beetle at Jaratschervo, in the district of Schrimm, in the Prussian province of Posen, has been officially reported.

THE HABITS OF THE FIELD VOLE.—At the British Association Meeting, Sir Walter Elliott made a few observations on the annual increase of the common vole (*Arvicola agrestis*) of late years. In the spring of 1876 they appeared in such numbers in the hill pasture farms of the Border districts between England and Scotland, and parts of Yorkshire and Wensleydale, as to destroy the grazing ground on which the sheep depended in spring, causing serious loss to the farmers by impoverishment and death of stock. The shepherds destroyed as many as they could without sensibly diminishing their numbers, although assisted by birds and beasts of prey—hawks, buzzards, owls, weasels, foxes, &c. At the same time that the vole was doing such mischief, another species (*Arvicola arvalis*), not known in

England, made its appearance in Hungary, and attacked the corn-fields, which it had done to a less degree in two or three previous years, and this year they had attacked the wheat-fields of Moldavia, as appears by a late paragraph in the *Times* newspaper. Many instances are recorded of great damage being done by them, both in England and Scotland, by destroying plantations, of which Mr. Jesse described a notable instance in New Forest and Dean Forest some time ago. These examples prove that they do not confine their attacks to pastures and woods, and it is possible that they might, under favourable circumstances, betake themselves to our corn-fields. It is therefore worth consideration whether our game-preservers should not be more forbearing towards the hawks, owls, and weasels, which are nearly exterminated in many places, although they live almost entirely on these and other small creatures. Sir Walter inquired whether anything similar had been seen in Ireland; also whether, as moles and hedgehogs were the natural enemies of the vole, they should not be spared; and with reference to a statement in "Bell's History of British Quadrupeds" (last edition) that the hedgehog was not found in Ireland, whether this was really the case? Several speakers said that the hedgehog was very plentiful in all parts of Ireland.

Dr. Sclater on Specific Names.—In answer to Robin Goodfellow, in Science-Gossip, p. 189, I would observe, that it is a great error to suppose that specific names must necessarily be adjectives. In many cases they are substantives, and may then be of a different gender from the generic name, *e.g. Turdus merula*, and *Cervus dama*. This is the case with the now scientific name of the common robin, which has puzzled R. G.'s little boy, and which is correctly written *Erithacus rubecula*, *rubecula* being a substantive like *Erithacus*, and standing in apposition with it. In the same way Linnæus called the Kestrel *Falco Tinnunculus*, the Bell Falcon, from its bell-like cry. But a recent systematist, under the same misapprehension as R. G., has proposed to alter *Tinnunculus* into *Tinnuncula* (!) because the genus to which he referred it, *Cerchneis*, is feminine. —*P. L. Sclater.*

The Earth-worm.—Professor Paley has added a great many interesting facts to the little-known habits of the earth-worm, but he has not exhausted the subject, and I shall only be too glad if I can add an item to what has been recorded. After some very wet days in the month of last June, I spent several hours in the dusk of evening carefully noting their actions, my great object being to discover by what means earth-worms dragged leaves, string, twigs, &c., along the ground into their holes. I knew, for I had often seen them clasp objects by their prehensile heads, twining their finely-pointed heads firmly round the object, and so draw it towards their hole, but I had reason to suspect that this, No. 1, was their ordinary but not their only method. Very carefully and quietly placing a candle on the earth where a number of large worms were foraging round their holes, I took care to place decayed leaves, &c., within the radius of the circle swept by their operations. The objects placed within their reach were, however, too much the colour of the soil accurately and distinctly to be sure of the *modus operandi*, the thought suddenly occurred to me to try white paper. Tearing up little strips about three inches long, I gave them a single fold, and placed one within the reach of a foraging worm. Very soon its elongated head came in contact with the paper, and instead of twining its head round the paper I saw it put its head underneath. Carefully watching, I saw a lip on each side of the paper, which being compressed between the two, the paper was held firmly as in a vice, and so dragged to its hole. Continuing the experiments with my paper bait, I saw distinctly that the worm can compress and almost flatten its head as easily as it can elongate it. When the head is rendered obtuse, it can extend it on each side of the mouth so as to form two large distinct lips, between which it took hold of the papers and dragged them to the hole; but this is only method No. 2. There is yet another, which at first I could scarcely understand. Observing a worm place its head under the white paper, so that its operation was invisible, I saw the paper, without any apparent means of motion, slowly, ghost-like moving along the dark ground to the hole of the worm. Its head was not *round* it, nor did its lips *enclose* any part of the paper, and yet it moved. Quietly and carefully, by candle-light, continuing for hours my observations, I saw that when it suited the creature's purpose best, it had yet a third method of attaching itself to its baits. The worm having retracted its head in the same way as when forming its lips, firmly *pressed* it for a moment *on to* the paper, and then apparently forming a sucker of its mouth, the paper was firmly attached to it, and so without being held, except as the leathern toy attaches itself by exhaustion of air to the stone, the paper followed the retreating worm and was dragged to its hole. I am perfectly satisfied as the result of my patient and tiring watching therefore, that the earth-worm can secure its object just according to which method best suits the thing it desires to obtain, either by encircling a part of it with its prehensile head, by pressing it between two expansions of the head-like lips, or by attaching its head and mouth in the way of a sucker. —*W. Budden, Ipswich.*

Notes of Great Tit.—Gilbert White, in his "Selborne," says the curious notes, resembling the whetting of a saw, are the early spring song of the Marsh Tit. I have always taken it to be the Great Tit's note. Can any reader of Science-Gossip inform me to which of these birds the song belongs? —*C. C.*

BOTANY.

Arum italicum. — This plant is mentioned in Hooker's "Flora" as occurring in the Isle of Wight; but Bentham says the white-veined variety of *A. maculatum* from the Isle of Wight is sometimes mistaken for *A. italicum.* I have a quantity of tubers of what I believe to be the true variety at the disposal of those readers of Science-Gossip who would like to naturalize them, by planting some in any situation where *A. maculatum* is established, in any shady lane or hedge-row, or in their own garden. I will forward one or more on receipt of stamped envelope. Larger tubers or extra number will require two stamps for postage.—*Dr. Morton, New Brompton, Kent.*

Mould in Herbaria.—May I suggest a plan that I have found to answer when a plant that has been insufficiently dried is attacked by mould. Let the sheet be taken out of herbarium and placed between two thick pieces of blotting-paper. Then iron well with hot iron, changing paper until quite dry. By that time mould will have entirely disappeared.—*Fred. W. E. S.*

How to Preserve Colours of Dried Plants. —In the July part (p. 165) a correspondent inquired for a method of preserving the colour of *Primula vulgaris* and *Primula elatior* for the herbarium. If the dried plant is painted all over with a mixture of one part of nitric acid to about twenty parts of spirits of wine it will retain its colour. I have a specimen of each treated in this manner, and though they have been mounted a long time, both petals and leaves are of the freshest colour.—*Fred. W. E. S.*

Flowers of Hollyhock.—On reading what I wrote about the hollyhock, I perceive an ambiguity, arising probably from an error on my part in writing. From seeds proceeding from the same flower, in fact, I have nine plants, four whose flowers have been crimson, one light red, one of darker, richer colour, and one white, which has opened its flowers since I wrote to you last, besides two plants which have not flowered yet at all. Of the plants with white flowers, which came from seeds borne on a branch of the same parent plant and flowered last year, two have blossomed again this year with white flowers as before; another, a smaller plant, growing between those two, had not flowered this year till a few days ago, when I was startled by the sight of a crimson flower on a plant whose flowers last year had been white. Here is variability indeed.—*John Gibbs.*

Verbascum blattaria.—I have found the Moth Mullein (*Verbascum blattaria*) in a waste place, near Luton, Beds. It was discovered on a hill-side, above chalk, with flints, by Mr. F. Wiseman, who brought it to me for identification. That you may be assured of its authenticity I enclose one blossom. I would send you more, but after the most careful re-examination of the locality we can find no other specimens of it.—*J. Saunders.*

Botany of Derbyshire.—The Rev. W. H. Painter desires us to say that he is engaged in editing a Plant-list for Derbyshire, and would be glad to receive communications from any botanist concerning it.

Sugar in the Nectar of Flowers.—This was the subject of a most interesting paper read before the recent meeting of the British Association, by Mr. A. S. Wilson, M.A., of Glasgow. Nectar, he said, is the sweet-tasted fluid secreted within the cups of flowers, and is intended to provide an inducement to cause insects to visit the flowers. These insects confer great benefit on the flowers by assuring their cross fertilization, bringing pollen from other plants and depositing it on their stigmas. The result of this is that the plant is enabled to produce seeds of much greater vigour than it otherwise would. The saccharine fluid is usually contained in the most secluded part of the flower, in order that it may be protected from rain, for, owing to the solubility and the diffusibility of sugar, were it not so protected it would speedily be transferred to parts of the plant where it could be obtained by the insects without their serving the plant in the way of cross fertilization. The colour, odour, and marking of flowers enable insects to find the nectar more easily. The importance of these insects will be apparent from the smallness of the amounts of sugar found in the flowers experimented on by Mr. Wilson. Flowers of fuchsia yielded a total of 7·59 m.m.g. of sugar; 1·69 of this was fruit sugar, and 5·9 apparently cane sugar. Of red clover each head gave a total of 7·93 m.m.g., fruit 5·95, apparent cane sugar 1·98. On each head of clover there are nearly 60 distinct florets. Calculating from these results there was the astonishing industry of the bee brought out in an extraordinary manner, for in order to obtain the kilo of sugar 7,500,000 distinct flowers must be sucked. As honey contained roughly about 75 per cent. of sugar, a bee has then to make two and a half millions of visits in order to collect a pound of honey. It was rather a curious fact that nectar should contain cane sugar, seeing that honey never did; indeed, were a vendor to sell honey containing cane sugar he would probably be prosecuted under the Adulteration Act. A change must therefore take place while the sugar is in the bee's possession—possibly through the action of the juices with which it comes in contact while in the honey-bag. As nectar is acid in its reaction it is, however, possible that the process of inversion may take place spontaneously.

Proposed Experimental Garden.—Mr. Laxton, Fellow and late Member of the Scientific Committee of the Royal Horticultural Society,

proposes to establish in a central locality and within easy access of London, an Experimental Garden, for the purpose of hybridising, cross-breeding, and selecting fruits, vegetables, flowers, ornamental and economic plants (chiefly hardy and half-hardy), for the raising and propagating of useful and choice novelties, scarce and little known plants of beauty and utility, and for the trial of new fruits, vegetables, flowers, &c. It is intended that all experiments shall as far as practicable be thoroughly and crucially conducted, and that each experiment with its results, whether apparently successes or failures shall be carefully and systematically recorded. The advancement of Horticulture will be the chief desideratum, but scientific and botanical considerations will be kept in view, and should available means and space be obtained, the improvement of cereals, forage, and other agricultural plants will also be sought. Amongst incidental objects will be that of testing the adaptability of introduced plants, &c., to the climate and soil of the district.

GEOLOGY.

The Extinction of the Mammoth.—Mr. H. H. Howorth read a paper on this subject, in which he examined the mode in which the Mammoth had become extinct in Siberia. His conclusion was that there had been a sudden and violent change of climate in that country, which had frozen the previously soft ground, and had also preserved the Mammoths as in a huge meat safe.

The Pikermi and Sewalik Deposits.—Mr. W. T. Blandford, F.R.S., has recently published his reasons for concluding that the above deposits are of *Pliocene*, and not of *Miocene* age, as they have hitherto been held to be by most geologists. The nature of the marine shells at the base of the Pikermi bone-beds attests a Pliocene age. One mammal (*Bos palæindicus*) found in the Upper Sewalik deposits occurs also in the Nerbudda alluvium, where it is associated with palæolithic implements.

Carboniferous Amphibia and Fishes.—Mr. W. H. Baily, F.G.S., Palæontologist to the Irish Geological Survey, read a paper before the Geological Section of the British Association on the above subject, in which he showed that the remains of amphibians and fishes were impressed on the true coal, in a coal-seam, 3 feet thick, at Jarrow colliery, near Castleconner, county Kilkenny. All the remains were turned into carbon, one of the fishes (*Megalichthys Hibberti*) being over 3 feet in length.

New Species of Star-fish.—Mr. W. H. Baily has described a new species of Star-fish from the Lower Silurian Caradoc beds of county Wexford, Ireland, under the name of *Palasterina Kinahani.*

A Permian Fauna in North America.—At the British Association meeting Prof. Cope described the remains of a fauna characteristic of the period which in North America succeeded the Carboniferous. It occurs in Illinois, and the remains were referred to Reptilia and Batrachia. In one genus, *Clepsydrops*, almost the entire skeleton was discovered. This was a clawed Lizard, with large canine teeth, and several incisors.

NOTES AND QUERIES.

Toads in Stone.—The stories concerning live toads which have been found inside limestone rocks are so well known and often well authenticated, that the fact can hardly be doubted. The article by Mr. Downes in your last number would seem to offer a good explanation of the phenomena. Any one who has observed the way in which the so-called "petrifying wells" at Matlock and other places deposit thick crusts on any articles placed in them, will easily perceive how the working up of a toad in a rock may be a question not of years but of months. We must remember, too, that though the independent testimony of quarrymen from many places remote from each other ought not to be set down as mere invention, yet exaggeration with regard to the thickness or solidity of the rock is very likely to take place. A short while ago, however, a curious story was told me about a toad having been found in the heart of an oak-tree. The toad was an enormously large one, and the impression of its body was plainly to be seen. When I saw the article in your last number, I wrote for further particulars, and have to-day received a reply to the following effect,—that the time was thirty or forty years ago, that the tree was a large oak in Pignell Wood in the New Forest, that it was cut in the spring of the year. The three men who cut the tree are dead, but my informant, who is getting an old man, well remembered the circumstances, and, I believe, was on the spot a short time after the tree was cut, and saw the impression; at any rate, the circumstance seems to be well remembered by him. I give the fact on its own merits, hoping that it may call forth an answer in explanation or otherwise.—*W. W. Fowler, Repton, Burton-on-Trent.*

Toads in Rocks.—To those interested in the subject of the frog and toad living without food, the following may be interesting:—In the Spring of 1876 I had occasion to go down a well, at Lewisham, to examine some pumps. Looking round for a place to put a few tools, I took out a loose brick from the side of the well, and, while putting my tools into the hole, felt something soft and cold, which turned out to be a frog: it was very thin and weak. I took it to the surface and carefully put it in a suitable place. The next day it had breathed its last; it was nothing but skin and bone. On making inquiries, I ascertained that during the Spring of 1875, while the pumps were being repaired, the frog had fallen down the well, and had been picked up and imprisoned, thus having been buried forty feet from the surface about twelve months. Its death, no doubt, was accelerated by the exertions it made to procure food. Shortly after this I was at Crayford Water-works, and mentioning the above circumstance to one of the turncocks, he told me that about twenty years previously he had put a toad into the hollow column of a drilling-machine he was helping to put up at a works at New Cross. I obtained permission to look

into the column of this drill-machine, and there, sure enough, was the remains of the toad, nothing now but a few bones and dirt. By its side was the wick of a tallow candle, but no trace of the tallow was left; possibly the toad had eaten the tallow, or, perhaps, the tallow had decomposed. I should state that the column was perfectly air-tight, and, as far as I could learn, had never been opened. It was about four feet high and seven or eight inches in diameter inside. The air inside was foul, as a light would not burn. Without comment, I leave these two instances to speak for themselves.—*M. O. Haydon.*

THE LONGEVITY OF TOADS.—I have read in the last number of SCIENCE-GOSSIP, the account, by Mr. W. Downes, of a live toad having been found in limestone rock. I believe there are several well-authenticated instances of that nature, one of which I now send you. My informant is a personal friend, and a well-known mining-engineer of great celebrity. About two years ago, in a Yorkshire coal-seam 600 yards below the surface, a live toad was found in the middle of a block of coal. My informant was not present at the moment, but within half an hour he saw the toad, then dead, and the hole out of which it came. He had no doubt whatever as to the truth of the collier's statement that the toad was in the hole alive at the time he broke the lump with his pick, and came out apparently unhurt, but lived only about twenty minutes. I believe my friend has the toad in his possession.—*J. D. Shakespear.*

TERATOLOGY OF LEAVES, &c.—I think the enclosed leaves as curious as the Cabbage-leaf of your last number of SCIENCE-GOSSIP. We received from South Africa some seeds of *Cobiæ Capensis* and some of *Mimosa.* We conclude, from the result, that a seed of each was set in one pot, as two distinct plants, yet united at the bottom of the stem, came up, and, as you see, there is a second freak in the union of the two plants. Can you tell me if this is only a freak of nature, or is there a plant that is always so?—*B. H. Kirby.*

GOAT CATERPILLARS.—Can any of the readers of SCIENCE-GOSSIP say whether there are any means of saving trees which have become infested by these caterpillars, and of preventing their spread to others in the same garden, other than cutting down and destroying the tree? If any know of a remedy, and would state it, it would greatly oblige, and save some valuable trees in this neighbourhood.—*A. Warner, Hoddesdon.*

BEHAVIOUR OF LIGHTNING DURING THUNDER-STORMS.—A friend and myself were talking of thunderstorms, apropos of the late ones, when he spoke of the lightning as having been observed by him leaving the earth and shooting up towards the sky. This, I replied, was owing to the position of the clouds, as electric fluid never left the earth in that manner during a storm, but might be seen darting from cloud to cloud. He, however, affirmed that it did so, and referred me to a work by Captain Snow Harris for confirmation of what he had seen. He also said that when trees or buildings were struck the injury was often done by the electric fluid leaving the earth, not, as I always supposed, attracted to it, and that the nature of its track displayed the fact. As I still doubt whether it be so or no, will you kindly settle the dispute?—*J. H. G.*

ROOTS OF THE PALM-TREE.—Two sermons have been preached lately in our neighbourhood on Psalm xcii. 12, "The righteous shall flourish like the palm-tree." In the first sermon special mention was made of, and a lesson was drawn from, the tap-root which we were told a palm-tree possessed. The second preacher, ignorant of the previous sermon, told us that a palm-tree had no tap-root like most other trees, and drew a lesson from its absence. "Where doctors differ disciples disagree." We should be greatly obliged if any correspondent of SCIENCE-GOSSIP could tell us whether palm-trees have tap-roots or not.—*A. B.*

PRESERVING ANIMALS.—The whole of the "modus operandi" of Waterton's method, most exactly described, may be found in the end of his "Wanderings in America." The early editions of this work are scarce, but I am happy to say a new one has lately been issued, price 3/6, and may be obtained of any bookseller, from the London houses. *W. Barrett-Rowe, Bristol.*

PRESERVING SLUGS.—In "Rambles in Search of Shells," and also in the article on "Land and Fresh-water Shells" in the "Notes on Collecting and Preserving Natural History Objects," the following receipt is given for preserving slugs. "Make a cold saturated solution of corrosive sublimate; put it in a deep wide-mouthed jar or bottle, then take a slug you wish to preserve and let it crawl on a long slip of card. When the tentacles are fully expanded, plunge it suddenly into the solution; in a few minutes it will die with the tentacles extended in the most lifelike manner, so much so, indeed, that if taken out of the fluid it would be difficult to say whether it were alive or dead." I have tried this repeatedly, and have never yet succeeded in obtaining one specimen with the tentacles extended. In most cases the head of the slug, when it is dead, protrudes a little outside the mantle, but there is no sign of a tentacle in any of them. I should be glad if any of the readers of SCIENCE-GOSSIP would give me information about the preservation of slugs, as I am anxious to obtain them for my collection of land and fresh-water shells. In the same books it is also stated that the best mounting fluid is glycerine and water in the proportions of one to one and one-half. But I find that the fluid becomes coloured a deep yellowish brown soon after the slug is put into it.—*B. E. Smith.*

GREY LAG.—In answer to "G. L.'s" inquiry concerning "Grey Lag," as applied to the goose, I beg to draw attention to the Cumbrian word *laghter*, brood of chickens, setting of eggs, which is from the A. S. *lecgan* to lay (eggs). The Grey Lag may therefore be the *Grey* Egg-*layer.*—*J. C. Clough.*

GREEN HASTINGS.—This cry undoubtedly is a corruption of Green "Hasties," for Coghan, in "The Hauen of Health," black letter edition of 1584, says, "There be three sortes of Pease common among us in Englande,—the first garden pease or hastie pease. The seconde sorte is called graie pease. The thirde greene pease, both growing in the fieldes." He then gives the cooking of them at that time, and states that "The two first sortes are used to bee eaten greene before they be full ripe. First they are sodden, then buttered, salted, and peppered. But if any student list to eate greene Beanes or greene pease, let him spare no pepper upon them, for this is a generall rule in Galen for meates that be windie." Also it appears at that day bread was made from peas, as further on he says, "If pease be unwholesome, then the bread which is made of them is unwholesome; yet it is much used in Lecestershire. But I leave it to Rustickes,

who have stomacks like Ostriges, that can digest hard yron."—*W. H.*

STRANGE FRIENDS.—In my parish, Lordington (Sussex), dwells a pretty little chestnut pony, of advanced years, who has been turned out to end his days exempt from toil; and in the same park is a white goose who has gone round the world with the British fleet. Between these dissimilar animals a friendship has sprung up. When any stranger approaches the goose, it waddles off cackling towards the pony, apparently for protection. The goose was, doubtless, a great pet with the sailors. Has any one observed a like anserine attachment?—*F. W. Arnold.*

MIGRATING BIRDS.—On dark nights from August all through the autumn I often hear birds passing over here. They make a constant whistling or piping noise, and begin to come over as soon as it is dark. They appear to fly in a westerly or south-westerly direction. I have never seen any of them, because it is only on dark nights that we hear these birds. Sometimes they seem quite close, just above the house-tops. At the end of August in 1875, several letters appeared in the *Times* about this migration. One correspondent said, "Soon after eight o'clock on the evening of Saturday, the 28th instant, my attention was drawn to a strange noise over my house. It was raining in torrents at the time, but I could distinctly hear, above the pelting of the storm, shrill cries, somewhat resembling the note of the Sandpiper, and the flapping of innumerable wings. This continued with scarcely any intermission for hours, at any rate until after twelve o'clock." This was eighteen or twenty miles from Maidstone. Another correspondent said, "These birds are frequently heard at Dover, and generally on 'dirty nights.'" I heard them here, for the first time this year, on Friday, the 2nd of August, and again on the following Sunday night, about ten o'clock. Are they Curlews and Sandpipers, and how far does their migration extend? Perhaps some of your readers could inform me.—*Henry Lamb, Maidstone.*

COLOURS OF DRIED PRIMROSES.—A lady friend has been very successful in preserving the colour of the petals of *Primula vulgaris* by adopting the following simple method. As soon as possible after being gathered, the plant must be killed by washing the roots for two or three minutes in *boiling* water, then dried with a soft cloth, and immediately transferred to the drying papers, which should be well warmed at the fire, and changed frequently, until the plant is perfectly dry. The corollas of a number of specimens she has treated in this way have preserved all their original beauty of colour, and the leaves have also retained their natural appearance. Some I myself dried, without first subjecting them to the hot water treatment, lost their natural colour, and changed to the bright green, which has annoyed so many collectors. I have been very successful in drying Orchids, by following the instructions given on page 88 of SCIENCE-GOSSIP for 1873, where it is recommended to dip the root and leaves in boiling water for a few minutes previously to putting the specimens in the press.—*R. Standen, Goosnargh, Lancashire.*

GEOLOGY OF NORTH DEVON.—If "W. Downes" would kindly give a few particulars as to his "finds" in this district, and a few hints as to localities, he would greatly oblige a native, who is now an occasional visitor, and would be glad to make the most of his time at his next visit.—*W. G.*

SEA ANEMONES.—I should be obliged if "C. A. Crimes" would kindly state in the next number of SCIENCE-GOSSIP *how* he feeds the baby sea anemones, as I find it an utter impossibility to make them take the food. After their birth does he leave them where they are or move them? I should also like to know whether he has any peculiar treatment for his *Bunodes gemmacea*, as I have been most unfortunate with mine. Within a few days of placing them in the tank they have a decomposed appearance, the colour fades, and they are covered with a sort of slime. *Sagartia venusta* I have succeeded very well with, and also *Sagartia bellis*, but the "gem" invariably dies directly. We once kept a *Tealia crassicornis* for three years, but this also seems a very difficult one to manage.—*C. E. R.*

PROTECTION FROM FOREST FLIES.—Having received personal benefit from the remarks in SCIENCE-GOSSIP on the Harvest Bug, I send a perfectly trustworthy recipe for the protection of horses from the Forest Fly. Smear the face and flanks well with parafin oil. I have been here nearly three weeks with my two young ponies; they are not foresters, and one cannot stand the fly at all without the oil.—*Catherine Middleton, Lyndhurst.*

BIRDS' EGGS IN WRONG NESTS.—The communications of Messrs. C. H. Sharp and A. F. Griffith on the above subject brings to my recollection an incident which happened in the north of Aberdeenshire, in 1865. When walking along the banks of a stream which ran through a wood, my cousin disturbed a wild duck sitting on, and attempting to cover, eleven wild ducks and thirteen pheasant's eggs, which were all crowded together in the same nest.—*A. M., M'c A., Stoke-on-Trent.*

WILD AND TAME DUCKS.—A pair of wild ducks located themselves on a moat surrounding the house of a friend of mine last October. During the severe weather they came to the feeding-place of the domestic ones, but otherwise kept themselves separate. In the spring, a tame duck hatched a brood of young ones near the haunt of the wild ducks, which now it is supposed were destroyed by them. Soon afterwards, the tame duck, whose brood was lost, was caught in the act of drowning the progeny of the wild duck, and succeeded in killing five of them before being discovered. She was at once sent off to another farm. In the same moat, several moor hens have reared their young for years, taking their departure regularly every winter.—*J. Wiggin.*

BARBOTS.—I enclose the following cutting from a newspaper, and shall be glad if any of the readers of SCIENCE-GOSSIP can tell me more of these insects (?). The name is quite new to me. Are they only to be found there? *Galignani* states that a terrible accident has just taken place at Biarritz. Miss Gordon, who had passed the winter in Paris, was drowned while out on an excursion. She attempted, without a guide, to go along the cliffs far beyond the point marked by the authorities as the limit for the public to go safely. She reached a place known as the Falaise de la Mort, and in stooping to pick a flower, her foot slipped, and she was precipitated into a hole known as the Barbots, a spot said to have this peculiarity, that at the end of forty-eight hours nothing more than the skeleton remains of any beings which fall into it. It contains millions of small insects which devour the body, and which are called by the inhabitants of the district barbots, and are by them held in especial horror. The Duke de Frias met his death under similar circumstances a few years ago.

EGG DRILLS.—Where are Egg Drills, described and figured at pp. 30 and 31 of "Notes on Collecting and Preserving Natural History Objects," to be obtained? As far as I know, they are not to be had at any of the naturalists' shops in London, where only very inferior implements for this purpose are sold.—*Beta.*

BIRDS SINGING AT MIDNIGHT.—Extract from the *Standard*, Feb. 22, 1878.—"W. F. E.," writing on the above subject, mentions something much more remarkable in the history of our singing-birds which has occurred in the immediate neighbourhood of Little Chart Rectory, Charing, Kent, within the last few days. Between the hours of eleven and twelve o'clock on the night of Friday last, the 15th inst., on Saturday night, and again on Sunday night, at the same hour, the blackbirds and thrushes were singing, whilst the smaller birds in the hedgerows were chirruping and twittering just as you hear them in the early morning in summer. He himself listened to them with open door and window, and he has been told by several who were out on those nights—the neighbouring doctor amongst the number—that they heard with wonder this, at such an hour, unusual melody."

BIRDS SINGING AT MIDNIGHT.—The singing of thrushes, robins, and other birds for several nights in succession, during February last—although, doubtless, accounted for by the singular beauty of the weather about that time—is such an unusual occurrence, that I should be very glad to hear of it prevailing generally in the country.—*X.*

BROTHERLY LOVE IN A GUINEA-PIG. — Some years ago I possessed a guinea-pig which had never shown any more wisdom than the rest of its species. One day a friend gave me a young rabbit which he had caught in a neighbouring warren, and I put it into the guinea-pig's cage. I was somewhat astonished to see the guinea-pig feed the rabbit with clover and other vegetables provided for its own nourishment. It also gave up to it the snuggest part of the cage. The guinea-pig continued these attentions till the rabbit was sent back to its native warren, when the unfortunate guinea-pig expressed its anguish in most pitiful cries.—*Anna Ward, Belfast.*

PHOSPHORUS IN SALT WATER.—I have observed that when thunder is prevalent, the flashes of light in sea water, occasioned by phosphorus, are much more numerous and distinct.—*A. Ward, Belfast.*

RANUNCULUS REPENS.—I have never heard the name "Devil's-claw" applied to this plant. In this part of Somerset it goes by the name of "Ram's-claws," as its long trailing stems are a great annoyance to the rakers in the hay-field.—*W. Herridge, Cucklington.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS. — As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

G. A. H. (Manchester).—No. 1. *Viola Curtisii*, a very characteristic specimen; No. 2. Some form of *Viola tricolor*, probably *V. Mackaii*; No. 3. *Statice auriculæfolia*, Vahl; No. 4. *Sagina apetala.*

E. H. (London).—No. 1. Everlasting Pea (*Lathyrus sylvestris*, L.); No. 2. *Erigeron*, sp.; No. 3. It is difficult to name a species from leaves only, but we believe your example to be *Oxalis acetosella*, L.

J. A. W. (Darlington).—No. 1. *Cerastium triviale;* No. 2. Mountain Willow-herb (*Epilobium montanum*); No. 3. Meadow Pea (*Lathyrus pratensis*, L.); No. 4. Common Valerian (*Valeriana officinalis*); No. 5. Restharrow (*Ononis spinosa*); No. 6. Bedstraw (*Galium verum*); No. 7. *Anagallis tenella.*

CUJAS (Beauly, Glasgow, N.B.).—Your specimens are as follow: No. 1. Bog Asphodel (*Narthecium ossifragum*); No. 2. Bur Marigold (*Bidens tripartita*); No. 3. Rough Chervil (*Chærophyllum temulum*); No. 4. Winter Green (*Trientalis europæa*); No. 5. Hogweed (*Heracleum sphondylium*); No. 6. Field Gentian (*Gentiana campestris*, L.); No. 7. Stitchwort (*Stellaria graminea*); No. 8. Earth-nut (*Bunium flexuosum*); No. 9. Red Dead Nettle (*Lamium purpureum*); No. 10. A very curious and remarkable monstrosity of No. 5; we hope to figure it in our columns shortly; No. 11. Dead Nettle (*Lamium amplexicaule*); No. 12. Lesser Spearwort (*Ranunculus flammula*).

Q. Q. (Elie Fife). — Unfortunately your example came to hand in a poor state to determine; it was partly decayed; it may prove to be *Lycium barbarum;* have you another specimen?

B. D. (Newport).—It is *Cirsium oleraceum.* We cannot tell why it is so named. Some of our thistles are edible.

E. W. (Bristol).—The Carex you send is *Carex paludosa;* it is nearly allied to *C. riparia.*

J. C. W. (Salterton, Devon).—No. 1 and No. 2 are both *Lotus tenuis*, Kit. According to Hooker a sub-species of *L. corniculatus*, L.; but it is readily distinguished from that species by its filiform and often shrubby stems.

G. W. BELL.—See article in SCIENCE-GOSSIP for July, 1877, by Mr. J. Young, F.G.S., on "How to Clean Fossil Polyzoa."

A SUBSCRIBER. — The best book on British Butterflies and Moths is unquestionably that of E. Newman. There you will find illustrations of every species except the Micro-lepidoptera. Morris's "British Moths" contains coloured plates, but they are not so faithful as Newman's woodcuts.

W. G. PIPER. — The lias, both at Lyme Regis and in the neighbourhood of Whitby, is full of fossils. A capital hunting-ground may be found at Aust Cliff, on the Severn, near New Passage, where there is an abundance of Rhœtic fossils. The carboniferous limestone at Castleton, Derbyshire, is a splendid fossil locality. The tertiary beds in the Isle of Wight are also exceedingly fossiliferous.

C. E. R.—You can purchase Sea-Anemones of Mr. King, Seahorse House, Portland-road, London.

F. W. E. S.—Your article will appear shortly in our pages.

J. W. S. (Sheffield).—Your exchange exceeds the three lines allowed gratis, and would have to be charged as an advertisement.

ESSEX.—The insect you trod upon which gave forth a phosphorescent light was most probably *Geophilus electricus*, one of the Millipedes.

J. R. MURDOCH.—Your Mosses are:—No. 1. *Hypnum Sendtneri*; 2, *Hypnum purum;* 3. *Hypnum tamariscinum;* 4. *Hypnum loreum;* 5. *Hypnum piliferum;* 6. *Hypnum Kneiffii;* 7. *Dicranella squarrosa;* 8. *Hypnum lutescens;* 10. *Hypnum splendens;* 11. *Neckera complanata;* 12. *Hypnum myosuroides;* 13. *Bartramia fontana;* 14, *Homalia trichomanoides.* Hepaticæ: 9. *Madotheca platyphylla;* 15. *Plagiochila asplenioides;* 16. *Scapania nemorosa.*

A. COLE. — Your Mosses are:—No. 1. *Sphagnum fimbriatum;* 2. *Sphagnum acutifolium:* 3. *Sphagnum subsecundum* (var. *contortum*); 4. *Sphagnum cymbifolium* (var. *squarrosulum*); 11. *Sphagnum cuspidatum;* 5. *Hypnum flagellare;* 6. *Dicranum scoparium* (young); 7. *Hypnum rivulare;* 8. *Ceratodon purpureus;* 9. *Bryum cæspiticium;* 10. *Hypnum serpens;* 12. *Hypnum sericeum.*

A BEGINNER.—The insect you describe was most probably one of the Hornet Clear-wings, a moth which simulates the appearance of the true Hornet in a remarkable degree. See Newman's "British Moths."

A. W. A.—There is a capital old-established Naturalists' Field Club in Liverpool, whose subscription is low, that would suit you and such as you, and we feel certain it would welcome artisan-naturalists. The president is the Rev. H. H. Higgins.

C. H. G.—The caterpillar of your moth had been attacked during life by an ichneumon (a not uncommon thing), and the ichneumon had deposited its eggs in the tissues of the caterpillar. These subsequently hatched into the condition you found them in, at the expense of their host.

X.—Your packet contained some of the purifying lime used in gas-works.

J. KIRKHAM.—The six ivory slides are very heterogeneous as to objects, and old-fashioned. No. 1 contains a piece of Red Seaweed (*Plocamium*) and of a Sea-fir (*Sertularia argentea*); No. 2 shows wings, legs, &c. of some orthopterous insects; No. 3, Fish-skin, Feather-barbule, &c.; No. 4, pieces of Snake-skin and part of a Beetle; No. 5, Coral-sand, portion of Diamond Beetle, of Sea-mat (*Flustra*), &c.; No. 6, piece of *Corallina officinalis* (a Sea-weed), of *Flustra*, and a group of Foraminifera (*Globigerina*). Please send us your address, as we have mislaid it.

UNDERGRADUATE.—The "rough" sketches will only permit of a rough guess at the names of the objects delineated:—No. 1 are possibly the fragments of species of some Echinoderm (*Spatangus* or *Ophiocoma*; 2. *Polyotomella*; 3. *Rotalina*; 4. *Heliopelta Metii* (diatom); 5. *Cingulum* or connecting zone of some discoid diatom; 6. *Actinoptychus* (diatom); 7. *Coscinodiscus lineatus* (diatom); 8. *Actiniscus Sirius* (diatom); 9 and 10. Upper and lower apices of *Sceptroneis caduceus* (diatom).

EXCHANGES.

WANTED, in exchange or for purchase, "Natural History Review" for years 1854 and 1855 (bound or in parts, latter preferred) and following numbers:—April, 1856; April, 1858; April and October, 1860. I have some odd numbers of same work, if required. — Alpha, 18, Upper Fitzwilliam-street, Dublin.

A STUDENT in pathology, having constant opportunities of procuring specimens in bulk (physiological and pathological), would be happy to send his duplicates, hardened in spirit and ready for making sections, to any gentleman, in exchange for Natural History specimens. Further particulars by letter.—W. Barrett Roné, 165, White Ladies'-road, Bristol.

SEVERAL Natural History curiosities to exchange, including Bat (stuffed), Python (stuffed), and a fine specimen of the Goliath Beetle; also a new copy of Rye's "British Beetles" (10s. 6d.). Wanted, Wood's "Insects at Home" or "Abroad," Lewes' "Sea-side Studies," British or Foreign Lepidoptera and side-blown Birds' Eggs.—W. Barrett Roné, 165, White Ladies'-road, Bristol.

OAK-feeding Silkworm Moth (*Yama Maii*) for portion of a wing. Send a stamped directed envelope to W. H. Gomm, Sandwich, Kent.

WELL-mounted sections of Sponges in balsam, showing spicula *in situ*: *Grantia compressa*, *Hymeniacidon suberea*, *H. caruncula*, *Halichondria panicea*, offered for unmounted pieces of Pachymatisma, Spongilla, &c.—T. H. Buffham, Clarendon-road, Walthamstow.

SEVERAL hundred Silkworms' Eggs for exchange, for Micro. or other objects of interest.—Mrs. Skilton, London-road, Brentford.

OFFERED, *Unio margaritiferus* from river Tay. Wanted, Anodonta, or other good freshwater or land-shells.—Address, Henry Coates, Bridgend House, Perth, N.B.

WANTED, Slides or Material, Triceratium, Diatoms, and Foraminifera, for well-mounted Slides, Alyssam, Eleagnus, Onosma. Material of same or other slides in exchange.—E. W. Burgess, 35, Langham-street, London, W.

WANTED, Harvest Bugs, *Trombidium autumnale*. First-class slides in exchange.—E. W., 48, Tollington-road, Holloway, N.

GOOD Microscopic Slides in exchange for any of Hugh Miller's works, or a good turn-table.—E. Edwards, 8, St. John's Cottages, Penge, S.E.

OFFERED, Nos. 42, 133, 164, 165, 185, 206, 242, 273, 386, 389, 390, 451, 452, 520, 550, 634, 729, 753, 761, 773, 831, 841 *b*, 1015, 1517, 1040, 1131, 1259, 1406, 1501, 1571, 1572, in exchange for rare British plants.—W. J. Hannan, 6, Tatton-street, Ashton-under-Lyne.

LONDON CATALOGUE, 7th ed. wanted, 5, 7, 19, 23, 25, 61, and others, for 241, 120, 171, 804, 1136, 1379, and many others. —Miss H., 75, Todmorden-road, Burnley.

FOR a few scales of any six of the following send well-mounted object:—Greater Weever, Black Bream, Atherine Smelt, Blue and Ballan Wrass, Grey Mullet, Sapphirine, Red and Streaked Gurnards, Bass, Tench, Rudd, Roach, Dace; also, skin of Spotted Dogfish and Picked Dogfish.—E. M., 20, Cropley-street, New North-road, London.

FOR exchange, upwards of five dozen microscope slides, chiefly parasites, wanted in exchange, parasites, either mounted or unmounted.—W. A. Hyslop, 22, Palmerston-place, Edinburgh.

PALATES of *Helix aspersa* and *Patella vulgaris*, neatly mounted, in exchange for good slides or material.—J. Blacksham, 78, Lozell's-road, Birmingham.

ROSA *tomentilla*, *dumetorum*, *Reuteri*, &c., for *Caltha Guerangerii*, *Digitaria humifusa*, and other Rosæ and Rubi. —G. C. Druce, Northampton.

WANTED, Rubbings of Monumental Brasses from all parts of England: exchange natural objects, Rubbings from Kentish churches, or Curiosities. Have SCIENCE-GOSSIP from commencement.—F. Stanley, 6, Clifton Gardens, Margate.

BRITISH Land, Freshwater, and Marine Shells, and British Lepidoptera, offered for British Marine Shells or foreign Helices.—Thomas H. Hedworth, Dunston, Gateshead.

BIRDS' EGGS, side-blown, labelled, picked, well-marked specimens. Wanted, side-blown specimens of many varieties. —Henry Sissons, Westbourne-road, Sheffield.

F. S. COLLINS, 26, Tremont-street, Boston, Mass., U.S.A., would like to exchange American Algæ for English or others.

WANTED, Rev. J. G. Wood's "Insects at Home" and "Insects Abroad," or any similar works, for foreign insects, mounted or unmounted, chiefly parasites.—M., Anglesey Lodge, Godalming, Surrey.

To Conchologists, resident at home, abroad, or in the Colonies.—Having duplicates of nearly 100 species of the British Land and Freshwater Shells, including many of the rarer British Vertigos, such as *Substriata minutissima*, *Alpestris*, *Pusilla*, and *Angustior*, would be glad to exchange these for foreign or colonial shells equally good. Also in duplicate, *Limnæa involutus* and *Succinea oblonga*, for other English, Land, and Freshwater Shells, in quantities suitable for foreign exchanges; many common species required.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

SIDE-BLOWN Eggs.—Many very rare specimens for exchange, mostly marked with collectors' own marks for authentication. Wanted, Woodcocks, Ruffs, Puffins, Nightjars, Shags, Wagtails, Hobies; also, American and other foreign species.—Sissons, Sharrow, Sheffield.

FOR injected human Kidney, stained section of human Intestine, and Japanese Grass, all in balsam, send pure gatherings of diatoms, or any well-mounted balsam slide, to J. A. Kay, Mansion House, Brompton, Chatham, Kent.

"HALF-Hours in the Green Lanes," new and clean, offered for Lepidoptera, or books on Entomology.—A. Wheldon, 8, Albion-street, Darlington.

NUMBER of first class Anatomical Slides wanted, for first slides or material; send sample and list for sample and list to James Green, the Cross, March.

CRETACEOUS Fossils to exchange for others. Also, wanted, good books on Palæontology. State price, &c.—J. A. Floyd, Alcester, Warwickshire.

WANTED, in exchange for well-mounted microscopic slides, SCIENCE-GOSSIP for 1870, unbound; also, 1865–66–67. List sent to choose.—W. Wise, Broad-street, Launceston.

OFFERED Nos. 68, 70, 140, 233, 284*c*, 625, 682, 1071, 1074, 1341 and *b*, 1577, 1600, 1634*c*,—for 4*b*, 6*bc*, 15*b*, 18*c*, 23, 28*b*, 32, 37, 48*b*, 50, 50*b*, 52*b*, 57*b*, and Malva Borealis. Lists exchanged. —C. A. O., 30, Queen's-road, Hastings.

L. C., 7th edition, Nos. 135, 146, 176, 235, 237, 246, 369, 527, 556, 611, 702, 730, 767, 769, 858, 864, 882, 913, 929, 988, 999, 1130, 1140, 1262, 1332, 1485, 1519, 1615, and many others, in exchange for other rare species. Send list to J. Tempere, 10, Heald-place, Rusholme, Manchester.

WITHERING on British Plants, 4 vols. cloth, 1830, Quekett's Lectures on Histology, 2 vols. cloth, 1852, in exchange for unmounted British Mosses, British Birds' Eggs or offers.—J. R. Murdoch, Horsforth, near Leeds.

GREEN Woodpecker, Red Grouse, Sparrow-hawk, Long-eared Owl, Pochard, and pair of Water-hens, in separate cases, in exchange for Microscope or offers.—J. R. Murdoch, Horsforth, near Leeds.

BOOKS, &c., RECEIVED.

"Flowers: their Origin, Shapes, Perfumes, and Colours." By J. E. Taylor, Ph.D., F.L.S., &c. Second edition. London: Hardwicke & Bogue.

"Alphabetical Handbook to England and Wales." London: John Murray.

"The Sight, and how to Preserve it." By H. C. Angell, M.D. London: Hardwicke & Bogue.

"The Speaking Telephone, Talking Phonograph, and other Novelties." By George B. Prescott. New York: Appleton & Co.

"Boston Journal of Chemistry." September.
"American Journal of Microscopy." ,,
"Land and Water." ,,
"Midland Naturalist." ,,
"Chambers's Journal." ,,
"Ben. Brierley's Journal." ,,
"Botanische Zeitung." August.
"Science pour Tous."
Various Pamphlets.
&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 10TH ULT., FROM:—F. K.—C. H. G.—G. C.—J. W.—E. D. R.—E. E.—T. S.—E. H.—C. M.—D. D.—T. L.—W. J. H.—A. B.—G. C. B.—E. W.—X. C.—J. W.—A. W.—E. W. B.—W. H.—R. D.—A. H. B.—A. J. J. B.—J. M.—G. D.—H. E. W.—Dr. G. A. S. —W. H. N.—C. H. B.—J. R. M.—E. T. C. W.—K. D.—J. C. W.—P. L. S.—W. W. S.—M. G.—H. C. C. M.—W. B. R. —J. A. W.—G. R. R.—J. K.—Col. B.—W. F.—W. W. F.—J. L.—H. C.—J. H. M.—A. T.—M. P. H.—Mrs. S.—I. C.—W. H. G.—B. H. K.—J. D. S.—G. D. S.—W. C.—A. W. A. —T. H. B.—G. S. H.—Dr. J. H. G.—J. G.—Dr. B.—Col. M.—J. W. N.—C. E. R.—T. S.—J. C. C.—Dr. M.—W. M. C. C. S.—F. W. E. S.—A. W.—C. C.—W. W.—W. H. W.—H. L.—F. S.—W. C.—J. W. S.—R. S.—F. H. A. —J. F. S.—J. R. M.—H. J. B.—W. G.—G. C. D.—T. H. H. —H. S.—J. C.—S. M.—R. T. G.—F. S. C.—W. H. P.—W. W. F.—E. C.—W. H.—W. H. B.—R. A. B.—H. C. C.—J. B.—A. B.—W. A. H.—J. G.—J. C. C.—M. J. W.—C. A. O. —B. S.—B. E. S.—J. A. K.—Prof. J. T.—W. W. F.—J. A. F. —W. W.—A. W.—H. T. S.—G. P.—W. B.—O. P. C.—E. M. —W. G. P.—S. F.—W. G.—G. W. B.—&c. &c.

QUARTZ, AS IT OCCURS IN THE LAKE DISTRICT: ITS STRUCTURE AND ITS HISTORY.

PART II.

BY J. CLIFTON WARD, F.G.S., F.R.M.S., &c.

QUARTZ AS A MICROSCOPIC STUDY:—

Having enumerated the various forms and conditions under which quartz is found in the Lake District rocks, I wish to say something about its internal structure as revealed by the microscope. The method of study is this:—The fragments of quartz, or the rocks containing quartz, are sliced very thin and mounted, the slice being reduced to such a degree of thinness as to allow of its ready examination by transmitted light.

At the outset let us find out what can be the difference between a piece of opaque white quartz and clear transparent rock crystal. The difference is somewhat similar to that between a piece of opaque ice and a piece of glassy transparent ice; for if water be frozen very quickly, a large number of air-bubbles will be entrapped, while slow freezing enables the air to escape. Or, again, take a handful of snow,—it is white, but decidedly opaque. Though formed of clear crystals of ice, air is so mixed up with them that the rays of light, constantly suffering reflection from the limiting surfaces of the two, are unable to pass through the mass. Subject such a mass of snow crystals, however, to powerful pressure, the air will be squeezed out and the formerly opaque snow may be converted into a block of transparent ice. Reverse the experiment; pound up your block of clear ice, and once more you have an opaque white powder, the minute icy particles being separated from one another by air. The same may be done with a transparent quartz crystal: grind it to powder, and the powder is found to be opaque and white.

Hence, may we not conclude that the difference between clear rock-crystal and opaque white vein-quartz is that, while in the case of the transparent quartz there is nothing or but little to reflect the rays of light or to prevent their passing uninterruptedly through the mass, in the case of the opaque white quartz there must be something included which acts in the same manner as the air-bubbles in opaque or cat's ice, as it is called? The microscope reveals what this something is.

Take a piece of ordinary vein-quartz, and examine a thin slice of the same; every part of the field of view is seen to be full of little cells of very various form, some round, some long drawn out, some branched, and some even having a regular and what appears like a crystalline outline. Examine them more closely, and each little cell is seen to contain a bubble, sometimes large, and more or less flattened by the sides of the cavity, and unmovable; sometimes like the bubble in a spirit-level, moving sluggishly from end to end of a tube-like cell; and sometimes very small, and moving about freely in the cell, like a thing of life, perhaps visiting all parts of the cell in turn, occasionally becoming hazy and indistinct, because, passing to a deeper part of the cell, the bubble has gone slightly out of focus. If the cell, too, be very small, the bubble, owing to its extreme minuteness, may seem like a mere black speck; and in these cases the motion is exceedingly active, and reminds one still more of a living organism. What can these things mean? For a bubble to move thus freely about, all analogy would lead us to suppose that the cell must be full of liquid, except the bubble-spot, otherwise this free motion would be impossible. What, then, is the liquid? and what does the bubble contain? Mr. Sorby has paid great attention to these interesting facts, and has clearly proved: 1st, that the liquid in most cases is water; 2nd, that the bubble is a vacuum, or empty spot, when the movement in the cell is very free; and 3rd, that the water is frequently saline, and sometimes the cells contain small cubical crystals of salt. Thus we

have the astounding fact revealed to us, that in every small fragment of opaque quartz there are thousands upon thousands of these minute liquid parcels shut up within it, and each containing a vacuous bubble. Again, we ask, what can this mean? Can it be that water has had so large a part to play in the formation of this hard mineral quartz, that granite, which we used to look upon as a molten rock formed in the bowels of the earth, can yet have been formed largely in connection with water? for the quartz combining with felspar and mica to form granite is literally full of these minute water-cavities. Let us see how this can be in the case of granite, and then other quartz occurrences may prove easier to understand. Mr. Sorby has made many and delicate researches into this subject, and he has found that on subjecting the liquid cavities to heat, first, any minute crystals of salt contained in them are slowly dissolved; and second, that when the heat is made sufficiently extreme the minute bubble becomes smaller and smaller until finally the liquid fills the whole cavity, the bubble completely disappearing. Now it is evident that these little parcels of water must have been enclosed within the quartz on its solidification, when the granite was being formed deep beneath the surface, for all geological evidence goes to show that granite is deep-seated in its formation; although of various ages, yet no other rock is ever found beneath it. Therefore, it is further evident that when first enclosed the water must have been in a highly heated condition, and unable to attain the state of vapour by reason of the great pressure to which it was subject, so that we may regard the liquid now contained in the quartz as part of the original mother-liquor, if I may use the term, which, together with a heated condition of other minerals, and great pressure, made up the conditions under which the granite was formed. In the formation of the granite the two minerals mica and felspar were the first to crystallize, impressing their form upon the semi-molten or semi-fluid quartz, which solidifying last, wrapt up within itself large quantities of the highly-heated water in the form of minute liquid parcels or cavities. Subsequently, on cooling of the mass, removal of pressure, or both, the water would cool, but being closely sealed up in glassy (quartzy) cavities or minute bottles, it could not escape in the state of vapour any more than at the first, but in its cooled condition would occupy a slightly less space, in other words, the contraction would leave a minute bubble or empty space (called for convenience' sake, a *vacuity*), which vacuity you will see must have a size proportionate, first, to the size of the liquid parcel; second, to the heat and pressure under which the fluid was originally confined. Hence, if it is found that in a number of cases the *relative* size of vacuities and liquid-cavities is the same, these relative dimensions give us clue to the amount of combined heat and pressure under which the granite (or, to speak more accurately, the quartz of the granite) was formed. Here, then, is an interesting problem; but at the outset it appears that to find out the exact amount of either the heat or the pressure, it is necessary to know that of one of these elements; thus, if we knew the pressure and observed the relative size of vacuity (or bubble) to liquid-cavity, we should have the two elements from which to calculate the *heat;* or, if we could form a tolerably accurate estimate of the heat, and made observations on the relative size of vacuity and liquid-cavity, these elements would allow us to form some fairly correct idea of the *pressure* under which the rock was formed.

Now, by an elaborate series of investigations, Mr. Sorby has shown it to be very probable that the heat was not much greater than 360° C. (680° Fah.), or not more than a dull red heat visible in the dark. We have already seen how the water in many cases contained, when hot, more mineral salts dissolved in it than could be so contained when cold; hence the small crystals of salt sometimes found in the liquid-cavities; but Sorby has also called attention to the fact, that crystals of the mineral called Schorl (a variety of hornblende) are frequently enclosed in the liquid-cavities, and that these would be fused at any temperature greater than a dull red heat; and from this and other facts he has fixed on the temperature of 360° C. (680° F.) as the probable extreme at which the quartz of granites was formed. Calculating on the basis of these elements, and having made a large number of observations upon the relative size of the vacuities and liquid-cavities in the quartz of the Cornish granites, Mr. Sorby arrived at the conclusion that the mean of the pressure expressed in feet of rock under which the Cornish granites were consolidated was 50,000 ft. (this not necessarily the actual depth at which formed).

(*To be continued.*)

THE CRITICAL BOTANIST.

THE educational value of "natural" or biological science, as distinguished from "physical" or "experimental" study, depends on the stress laid, not only on mere observation, but on observation at once careful and minute. Experiment is being introduced with much good result into the biological sciences. It teaches handiness or skilful manipulation, and exactitude in recording results. The use of quantitative analyses and statistics has also a great value, not only to science, but also to education. Still, critical observation is the chief educational *raison d'être* of biology, and especially of botany, to the tyro. In proportion as it is careful and minute, will this observation be valuable to the observer. Its value to science is really a secondary matter, and will come unexpectedly, being dependent, not only on care and minuteness, but also on what may be termed "rationality." By this, I

mean a direction of observation into channels of importance, channels not filled by work already done. This "rationality" will come to the tyro who both studies and observes.

As I know that the unbotanical and junior students are entirely ignorant of what "critical botany" means, and as science sadly needs more critical observers, I thought SCIENCE-GOSSIP would be the best medium for a few notes on the subject.

Criticalness is necessary in all branches of the science. In the chemistry of plant-life, it is not enough to know that certain elements occur in certain plants. We want to know in what proportions they occur, in what manner of composition, at what periods of the life of a plant, and in what organs or tissues. We want to know where the plant gets them, how it assimilates them, what changes they undergo in the plant, and whether they are essential to its life. This amounts to a want—very partially supplied at present—of detailed chemical analysis of various tissues and organs of many different species at various stages of growth and decay, and an extended practice of the valuable experiments in "water-culture," the growth of various plants in definite solutions.

In general Morphology or Minute Anatomy, we must not rest content with knowing that such and such a member is built up of such and such tissues, or that these latter are composed of various laminæ of cells or vessels of different shape or structure. We want also to see the mode of development of each cell, how they make up the vessels and tissues, and how the complex member arrives at its complexity. Not only is there room for additional research on the functions and behaviour of the nucleus of cells and for further elucidation of the history of starch, but the subject of the crystalloid granules, the aleurone particles, and the "raphides," or true crystals, contained in the cells of many plants, is a mine but slightly worked. Systems of branching and phyllotaxis are also lines—among many I might mention—in which there is yet much to be done by accurate observation, especially that of development.

In elementary Physiology, science stands in need of help, rather from experiment and statistics than from pure observation; such as the experiments of Professor McNab on the movement of water in plants (*Trans. Roy. Irish Acad.*, vol. xxv.), those of Sachs on the corroding power of roots, and of Mr. Darwin on twining plants.

In special Morphology and Physiology, however, there is an inexhaustible field for new and valuable observation. The life-history of the lowest plants, as studied by Messrs. Dallinger and Drysdale; the hybridization of ferns and flowering plants, both in cultivation and in a wild state; the homology of certain special organs, in various groups, worked out, as Mr. S. H. Vines has done that of the suspensor (*Quart. Journ. Micros. Sci.*, Jan., 1878); the minute anatomy of the leaf as a classificatory character, as Professor McNab is proving it among the Conifers; the floral development and teratology, or abnormal forms, of various groups, studied on the method inaugurated in Payer's *Organogénie de la Fleur*, excellent examples of which may be seen in Dr. Masters's paper on Primula, just issued, in the *Transactions of the Linnæan Society*, in his note on the Compositæ, in the *Journal of Botany* for February, and in Mr. Hartog's paper on the Sapotaceæ, in the same journal for March: these are a few of the wider subjects for critical study. Here it will be seen that it is often necessary that observations should be both numerous and even continuous, and that they should be compared one with another.

But even in the simpler and isolated observations of the collector and tyro, the critical faculty comes equally into play. I call it a faculty, for, like the imagination of the poet, some people seem to be utterly destitute of it; but I have little doubt that this arises, mainly, from its never having been cultivated, educed, educated. If you have a garden, and are likely to remain in one locality for years, you may render much service to botanical science by observing the exact date of the opening of leaf-buds and flower-buds in various species in each year, noticing also the altitude above sea-level, latitude and soil of your garden; and, if possible, other meteorological details, such as rainfall, thermometric and barometric observations, wind, &c. If you can name, or capture and get named, the various insects which feed upon your plants, or which visit their flowers, distinguishing those that suck the honey, those that eat and those that carry away the pollen, you will also be doing good scientific work.

If you collect wild plants, it is important to notice the altitude at which a species occurs, the nature of the soil it grows in, and its exact topographical position, so that it can be seen, not only in what county and parish it occurs, but also in what river-basin; since the vast importance of river-basins in the distribution of plants is now generally acknowledged.

Lastly, it is important to note exactly what your find is. This is what English botanists generally speak of as critical knowledge. You must make yourself sure, not only of genus and species, but in many cases of sub-species, variety, or variation. To do this is time well spent. It makes you examine a plant more closely than if you already knew it well, were told its name or identified it, as some tyros do, from its general resemblance to a picture.

By this close examination you unconsciously gain a far deeper and more permanent knowledge of a plant than by being told its name; and, moreover, your accurately determined locality for one of these "segregates," as they are termed, may be of great use in the generalizations of botanical geography. Independently, therefore, of any theory as to the origin of species, it is far better, from the point of view of self-education and instruction, to be a

"splitter" than a "lumper." For books, then, the student cannot have a better general manual of British Botany than Professor Babington's. For many groups, however, he will do well to use special monographs; and it must also be clearly understood that varieties are hardly to be recognized by mere "book-characters," but must be studied in the living state.

In conclusion let me take as an example the first group which requires critical study in the first of the natural orders, viz., the genus Thalictrum (Meadow-rue), among the Ranunculaceæ. Whilst the order Ranunculaceæ, which contains some thirty genera and some five hundred species, is almost universally distributed, but is especially abundant in temperate and cold regions, the genus Thalictrum is confined to the northern hemisphere. Like the order to which it belongs, this genus is essentially European, occurring comparatively rarely in North America, North Africa, and Asia, in which continent it is only known in the north and west, to the Himalayas. The order is what is termed a very "natural" one, being, in spite of many anomalous genera, clearly defined and separated from its nearest allies. It is also readily and naturally divisible into the five tribes, originally framed by De Candolle; viz., Clematideæ, Anemoneæ, Ranunculeæ, Helleboreæ, and Pæonieæ. The last two of these agree in having the fruit "dehiscent," *i.e.* splitting when ripe, and all except Clematideæ have the sepals overlapping, or "imbricate." Anemoneæ and Ranunculeæ differ in having the single ovule in each "achene," or indehiscent carpel or fruitlet, pendulous in the former, ascending in the latter. The genus Thalictrum, along with Anemone, Knowltonia, Adonis, Callianthemum, and Myosurus, constitute the tribe Anemoneæ. Knowltonia curiously occurs in South Africa, and Myosurus in Europe, Asia, Africa, Australia, and New Zealand. Thalictrum and Anemone differ from the other genera of the tribe in having no petals, and Thalictrum is distinguished from Anemone by the absence of the involucre of three leaf-like bracts characteristic of the flower-stalk of the latter. The Meadow-rues are herbs with a perennial rootstock and erect habit; leaves bi- or tri-pinnatisect and stipulate; inflorescence panicled or in a raceme, without any involucre, often polygamous; sepals four or five, imbricate, petaloid, and dull green, yellow, purple, or whitish in colour, usually small; petals absent; stamens numerous; carpels on a narrow receptacle, with short styles, which are persistent or deciduous, and with one pendulous ovule in each, afterwards forming a fruit of achenes, which are often stalked, and are variously ribbed, nerved, or winged. There are about fifty species, some three to six of which only, accordingly as one "lumps" with Hooker or "splits" with Babington, are British.

G. S. BOULGER.

(*To be continued.*)

NATURAL HISTORY IN THE SEVENTEENTH CENTURY.

By F. Kitton, Hon. F.R.M.S., &c.

Part II.

THE ignorance of natural history displayed in the description of animals living in distant lands, may be excused on the ground of the difficulty of obtaining any accurate knowledge of their habits, or even form, from those who had seen them in their native wilds. The principal authorities were sailors, who, with that love of the marvellous usually accompanying ignorance, allowed their imaginations to run riot in describing the animals or plants of foreign countries.

This excuse will not, however, apply to the author's descriptions of our domestic animals, as the following extracts from the chapter on dogs will show:—

"OF THE DOGGE

IN GENERALL.

"A Dogge is called in hebrew *Keleb*, and *Lamas* according to *Munster*, in Caldee *Kalba*, in Arabique *Kalbe*, in Persia *Sag;* the Saracens *Kep* or *Kolph;* the Græcians *Kuon*, because of his love to man, and vulgarly at this day *Skilos* and *Skirlè;* the Medians *Spaco*, the Germans *Hund*, the Italians *Cane*, the French *Chien*, the Spaniards *Perro* or *cavendo*, because his barking is as loud as an Artificiall song; also *Catellus*; the Illyrians *Pes* or *Pas*, and the Latins *Canis*.

"There is no region or countrey in the world where these are not bred in some store, as shall be declared afterwarde, in the particular discourse of every kind of Dogges. For as shall be manifested more at large, there are Dogges very great, some for hunting, some for Warre and defence, some for the Bull or Bear, some for the Hare, Cony, or Hedgehog; againe, some are smaller, which are called Hounds, Braches,* Beagles, Shepheardes Dogges, House-curres, Spagnels, both for Water and Land; and some foysting Dogges,† for the pleasure of the rich.

"In the first-place there are to be handled the nature of Dogges in generall, wherein they agree, and their common properties of nature, such as are not destroyed in the destinction of kindes, but remaine like infallible and invariable truths in every kinde and country in the world. . . . The outward proportion of the head altereth as the kind altereth, being sometime like a Lyon, sometime like a Hedgehog; some long with a broad snout, and some with

* These dogs are supposed to be dogs of scent. No very definite meaning seems to have been attached to the name by early English writers. The word is apparently synonymous with the old French word Brache (German Brack), translated *chien*. Shakespeare seems to have considered them as pet dogs. "Truth's a dog that must to kennel when Lady the brach may stand by the fire and stink."—*Lear*.

† Lapdogs; see fysting, in Nares' Glossary.

a piked snout; but the braine decreaseth and increaseth with the moon. There is no commissure or seame in his scull (like as in a mans), but it is a continued bone without separation inward or outward.*

"The louder and shriller voice of a Dogge is called barking, the lower and stiller is called whining or fawning. It was a monstrous thing that a Dogge should speake and a serpent barke, as it is beleeved in antiquity both came to passe, when *Tarquinius* was driuen out of his kingdom. It is not causelesse that the barking of Dogges hath attributed unto holy actions, and so ought the eies and ears of a Prophet be attendant upon heavenly things. The *spleene* because a Dog hath little or no spleene, and therof commeth his madnes and death whereof also it commeth that the seruants which have charge of Dogges being with them in their sickness and latter end for the most part prove splenaticke. Smelling, neezing, and Laughing, because the spleenatike can do more of all these, but of this more afterward."

The Rev. Topsell concludes his account of the Village Dogge or Housekeeper by relating the fol-

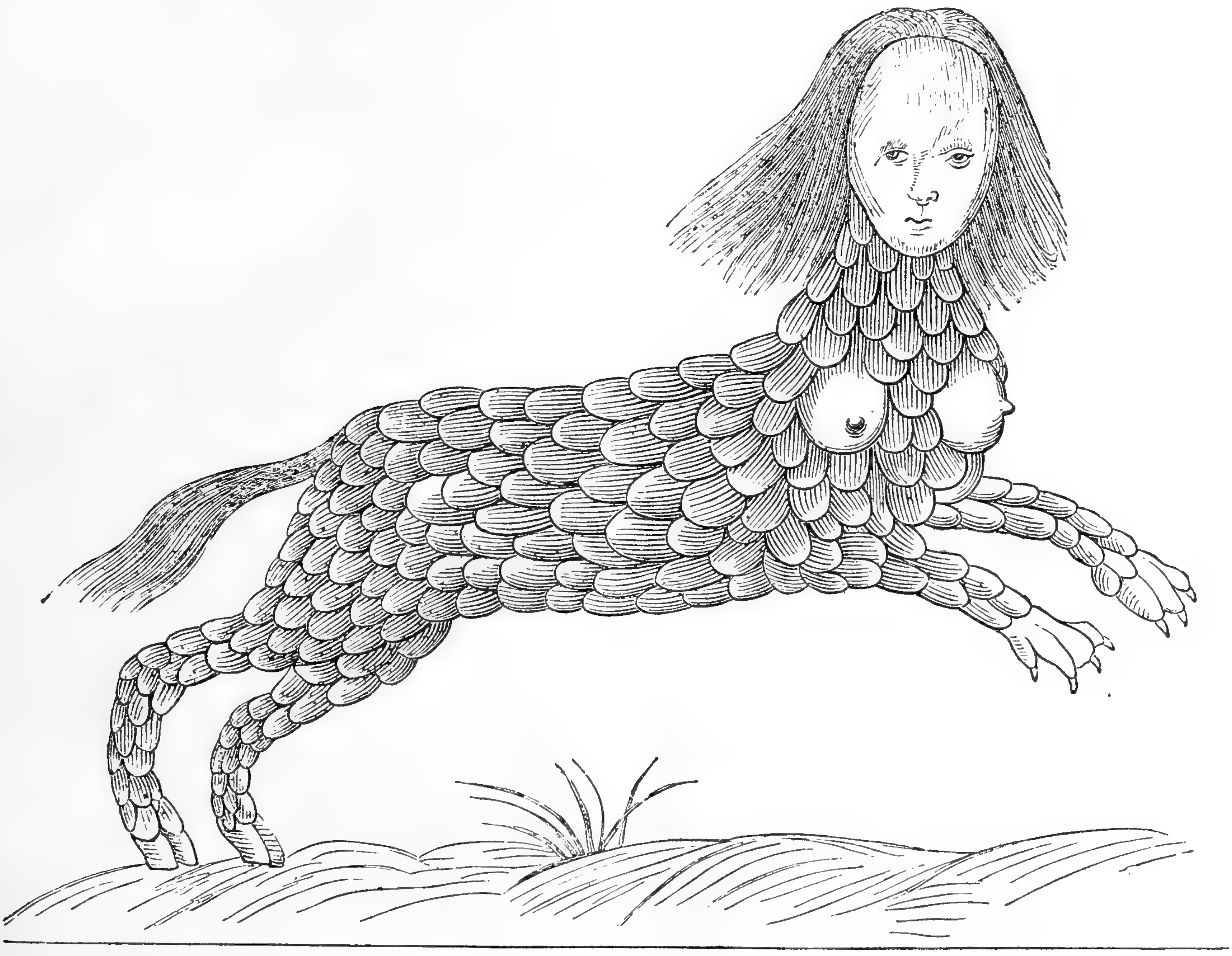


Fig. 201. The Lama.

it divers qualities, as for a man to dreame of the same presageth some treasonable harme by enemies, so likewise if they fawne and claw vpon a man.

"The Egyptians signifie three thinges by a Dog, *a Scribe, a Prophet, a spleene, smelling, laughing, neezing.* A Scribe because a Dog is silent more than he barketh, so must a perfect scribe meditate more than he speaketh, for to barke at euery one were to pleasure none, and to speake continually were a signe of madnes. Again, a Prophet because a Dogge doth most eagerly behold and admire constantly all

* If the writer had taken the trouble to examine a skull, he would have found that cranial sutures were present.

lowing anecdote, the truth of which is vouched for by *Antonius Schnebergerus*, an authority with whom I regret to say I am unacquainted.

"In a Church in Cracouia, dedicated to the *Virgin Mary*, wherein euery night are an assembly of dogs which unto this day (saith the Author) meete voluntarily at an appointed houre for the custody of the Temple and those ornaments which are preserved therein against theifes and robbers, and if it fortune any of the dog Dogges be negligent and slacke at the houre aforesaide, then will he bark about the Church until he be let in, but his fellows take punishment of him and fall on him, biting and rending his

skinne, yea sometimes killing him; and these Dogs haue a set dyet or allowance of dinner from the Canons and Preachers of the Church, which they duely observe without breach of order, for to day two of them will goe to one Cannons house and two to anothers, and so likewise al the residue in turnes successively visit the severall houses within the cloyster yard, neuer going twice together to one house nor preuenting the refection of their fellowes; and the story is reported by *Antonius Schnebergerus* for certain truth upon hia own knowledge."

He concludes his own history of dogs with a description and anecdotes of the little Melitæan Dog, of whose intelligence he relates some remarkable instances of instinct, far surpassing anything in "Jesse." One kept by a certain Italian, about 1403, called Andrew, is perhaps the most remarkable. The dog, although blind, "would find, even when buried in the earth, Rings, Iewels, bracelets, pieces of gold and silver, lent to his master by the standers by, and when he was commanded, give to every one his own King, Iewell, Bracelet, or money, which the blind dog did without stay or doubt. Afterward the standers by gave vnto him divers peeces of coine stamped with the images of sundry princes, and then one called for a piece of English money, and the Dog deliuered him a peece; another for the Emperors coine, and the Dog deliuered him a piece thereof: and so consequently every princes coine by name till all was restored, and this story was recorded by *Abbas Vrspergensis*, whereupon the common people said the dog was a diuell, or else possessed with some pythonicall spirit: and so much for this dog.

"Now a daies they have found another breede of little dogs in all nations beside the Melitæan Dogs, either made so by art, as enclosing their bodies in the earth when they are whelpes, so as they cannot grow great, by reason of the place or els impayring their growth by some kind of meat or nourishment.

"The Dogges of *Casamania* can neuer be tamed, for their men also are wilde, and liue without al law and ciuility, and thus much of Dogs in special.

"In the next place I thoght good to insert into this story the treatise of English Dogs, first of all written in Latine by that famous Doctour in Phisicke, *Iohn Cay*, and once translated by A. F., and directed to that noble *Gesner*."

This treatise is written in the form of a letter, which he commences thus. "I wrote vnto you (well beloued friend *Gesner*), not many years past, a manifolde history containing the divers forms of Beast, Birds, and Fishes, the sundry shapes of plants, and the fashions of Hearbes, &c.

"I wrote moreouer vnto you seuerally a certain abridgement of dogs which in your discourse uppon the formes of Beasts in the second order of wilde and tamable beasts wher you make mention of Scottish Dogs, and in the winding up of your letter written and directed to Doctour *Turner* comprehending a Catalogue or rehersall of your books not yet extant, you promised to set forth in print, and openly to publish in the face of the world among such your workes as are not yet come abroad to light and sight. But because certain circumstances were wanting in my breuiary of English Dogs (as seemed vnto me), I staied the publication of the same making promise to send another abroad which might be committed to the hands, the eies, the minds, and the iudgements of the Readers."

(*To be continued.*)

A FEW AUTUMN FLOWERS, WITH HINTS UPON THEIR CULTURE.

By Mrs. Battersby.

A GROUP of autumn flowers—not geraniums, or heliotropes, or calceolarias, though they are very brilliant and lovely for those who can afford greenhouses and forcing-pits, and the amount of care, time, and trouble which will tide these delicate favourites safely over a winter's frost and snow—but a bouquet of out-of-door plants which may be left in the garden season after season, gathering strength and beauty, and lighting up our autumnal *parterre* with their vivid tints.

One of our chief favourites is the Fuchsia. It is quite wonderful to find what numberless varieties of these beautiful shrubs will survive our winters. As a proof, I must tell you I once struck three cuttings of the then rare double white fuchsia; upon the approach of frost two were safely housed—the other, much to my annoyance, could not be found. Next summer my housed plants were healthy, but rather stunted both in leaf and flower; while the missing one, which had died down to the ground in winter, threw up long luxuriant shoots, and blossoms which looked like small white roses enclosed in rich crimson sepals. The sole protection which the young plants had enjoyed was a light surface-dressing of turf-mould;—and cocoa-nut fibre, coal-ashes, or moss would probably have answered quite as well. Fuchsias are very easily managed; the chief secrets are a rich, light soil, and a sheltered, yet sunny aspect. They enjoy the protection of a wall, and blossom particularly well when planted against one; and the sole drawback to the out-of-door culture of fuchsias is, that in late seasons their best flowers are generally "caught" some frosty night, and present a melancholy spectacle on the following day.

Next to my fuchsias I would place a real autumn gem, the tall, white anemone (*Japonica*), which, rising from a cluster of rather coarse but handsomely-shaped leaves, on a stem of more than three feet in height, bears a number of snowy blossoms singularly alike, both in shape and size, to the white wild-rose of our hedges; but though we miss the fragrance of the way-

side flower, our anemone has the charm of preserving its beauty in a vase for nearly double the time of the much-prized rose; indeed, with the exception of china-asters, pyretheums, and chrysanthemums, anemones might claim a prize for this property. *Anemone Japonica* is perfectly hardy, and easily cultivated, as the roots can be separated in early spring without injury to the plant; but a row of white anemones left undisturbed in front of a garden-hedge becomes one of the prettiest sights in an autumn garden—the masses of snowy petals are brought into such bold relief by their green background. For scarlet to place against our white blossoms perhaps *Lobelia cardinalis* can hardly be surpassed; except perhaps by some late blossom of gladiolus. But the lobelia is rather a capricious plant; it requires a large amount of moisture in a thoroughly well-drained situation. The most successful bed I have ever seen was made by removing about two feet of the upper soil, and placing a quantity (about half a foot) of broken bricks in the pit. The soil was then replaced, and the lobelias grew and flourished for years. Unfortunately they were removed to an adjacent bed without drainage precautions being taken, and they "damped off," or sent up sickly stunted shoots as long as they survived. A clergyman, for many years resident in America, told me the beauty and brilliancy of a swamp of lobelias in their native habitats is almost dazzling.

There is a rather pretty violet-coloured and also a lilac lobelia, both of which blossom in autumn; but even the scarlet of the lobelia pales beside the blossoms of the "velvet" *Salvia*, and its sister, the blue salvia, is not surpassed by any autumnal flower. The length of time this plant remains in blossom, if not destroyed by rains or high winds, is marvellous. First the "king spike," and then the side spikelets, seem never weary of showing their brilliant colouring to grace our autumn bouquet; and after a trial of six seasons out of doors, merely protected by a covering of turf mould, my noble plant is the admiration of all visitors. Sometimes in spring the early shoots of both salvias are cut off by frosts, but the hardy plant, like the field potato, only waits for a few congenial days to send up a succession of fresh sprouts from its uninjured tuberous roots. Blue salvias are easily reared from seed (if these are defended from robins, which seem particularly fond of them); they will also root from small side-shoots, or slips, in summer; but until the tubers form they should not be left out in winter time; and when the plants are meant to remain out of doors they should be planted in spring and left undisturbed during the summer, so that they can "settle themselves," as our old gardener used to call it, before winter.

And now for yellow to set off my scarlet, white, and blue favourites. I shall either take a few blossoms of *Viola lutea*, or twigs of Spanish broom; both are perfectly hardy. Though I shall not place purple beside blue, I may remark, *en passant*, that a bed of *Viola cornuta* of that lovely shade is at present one of the most brilliant spots in the garden, whilst its yellow sisters form glowing borders to several other beds, and they have now (October) been in blossom for the last three months. A box of slips taken from young shoots of violas (close to the ground), and stuck between the old cut-down plants in spring each season, will give a beautiful succession of flowers all through the summer months; and entomologists may care to know that the *Viola cornuta* and all its purple varieties are veritable moth-traps on summer evenings. The Spanish broom is a beautiful shrub in autumn, with one defect,—that it blossoms so late in the season that it is difficult to procure ripened seed.

And now I must look for some pretty leaves wherewith to form a background for my bouquet, and I shall find them in the delicate fern-like green of a bed of young carrots; they are so light as to prove invaluable at this time of year for arranging vases, and we may often find a leaf almost as scarlet as the lobelia beside it. One shade more and our group will be complete,—something dark,—and our children supply it. They have been out boating, and have brought home a bunch of "giant black-tufted grass," as they call it, a plume of which will make our autumnal vase of flowers quite artistic in effect.

FOSSIL POLYZOA.

The Genus Fenestella: its History, Development, and Range in Space and Time.

By George Robert Vine.

I.—*History of the Genus.*

SOME of the most prolific forms of animal life found in the palæozoic series of rocks are a group of Polyzoa, which has passed under several names. By the earliest investigators, some of these Polyzoa were classified with the corals, and were consequently placed by Goldfuss with the genus *Gorgonia*.* Other forms were restricted by the same author, and placed with Lamarck's genus *Retepora*. This was the status of classificatory knowledge when Phillips wrote his work on the "Geology of Yorkshire." Turning to one of the later editions of Brown's "Zoologist's Text-book," published by Fullarton, in 1833, I find the class Polypi placed among the Radiata, in the fourth division of the Animal Kingdom. The animals of this class were gelatinous, with elongated contractile bodies; and provided with an alimentary sac, which had one opening; mouth terminal, surrounded by radiated tentacula; the greater number of the species con-

* Linnæus

gregated, adherent, and forming compound animals.* The class was divided into five orders; but under one order, those of *Polypi vaginati, Spongia, Corallina, Gorgonia,* and *Retepora* found a home. With these were associated many of the corals, polyzoa, and anthozoa, which have been separated by later investigators, and placed under classifications altogether different from either that of Brown or Cuvier.

The generic character of Lamarck's *Retepora* is as follows: Stony, and interiorly porous, with thin, depressed, branched expansions, sometimes free, at others formed like net-work; the polypiferous cells on one side only, at the upper or internal surface of

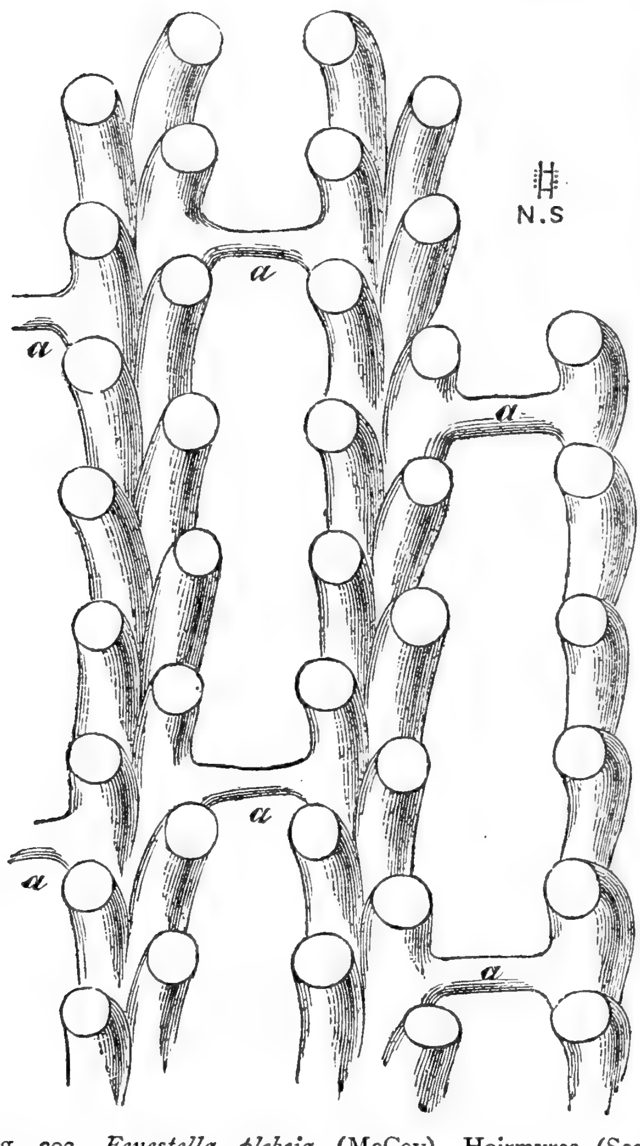


Fig. 202. *Fenestella plebeia* (McCoy), Hairmyres (Scot). Showing the growth of the dissepiments (*a*) from the Zooecia; sometimes from the base, at other times from just below the orifice of the cell. Natural size: about ⅛th of an inch to two fenestrules. *Diastopora megastoma* was parasitic upon this. (Transparent.)

the mass; and Brown gives as a type of the genus—*Retepora cellulosa*, with this restricted specific character:—Flattened, thin, greatly undulated, with elliptical cells; inhabits the Indian Ocean. With this before them, I can easily understand how difficult would be the labours of the earlier palæontologists. Both Goldfuss's and Phillips's Carboniferous, Devonian,

* Brown's "Zoologist's Text-book."

and Silurian Polyzoa had to be classified as they were, or remain unclassified, and consequently undescribed. The few fossils at their disposal forced them to be particular with the minute specimens in their possession, and the diagnosis of their species suffered in consequence of their poverty.

From the time when Phillips wrote his "Geology of Yorkshire," till the time of William Lonsdale, the founder of the "Devonian System" in geology, very little labour was bestowed upon the Palæozoic Polyzoa. Like the rest of the investigators, he was inclined to place the *Fenestella* with the *Retepora*; but previous to the publication of Phillips's "Palæozoic Fossils of Cornwall, Devon, and West Somersetshire," Mr. Miller, of Bristol, in correspondence with Phillips on Fossil *Zoophyta*, suggested that a new genus should be constituted for some of the reticulated corals allied to *Retepora* in the Carboniferous

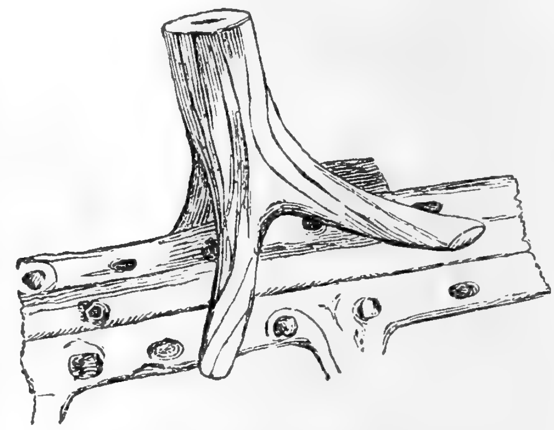


Fig. 203. Branch of *Fenestella* with "organisms" like *Palæocoryne* "parasitically" attached.

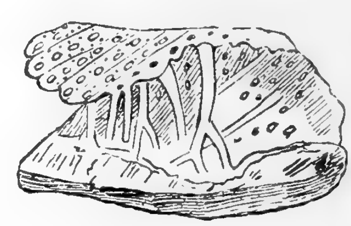


Fig. 204. This sketch of the fig of *F. banyana* was in all probability a recumbent form. The figure represents a cavity in the limestone, and shows the processes extending from the frond.—Mr. John Young, F.G.S. Fig. 4, plate 18, "Transactions of the Acad. Sci. St. Louis," vol. i. p. 450.

limestone. On mentioning this to Mr. Lonsdale, he at once adopted the suggestion, and named a species of the Silurian strata *Fenestella Milleri* (Lonsd.).* In 1841 Phillips himself adopted this term.

This more expressive generic term has since been adopted by nearly all writers on Palæozoic Polyzoa; and Lonsdale gave as a description of the genus, characters altogether different from *Retepora*, and more in accordance with known facts. It is impossible for me to give the exact description as given by

* Phillips's "Palæozoic Fossils of Cornwall, &c." Through the kindness of Mr. Plant, curator and librarian of the Peel Park Museum, Manchester, I have been allowed to extract whatever I required, and trace the original figures of specimens from this rare volume.

Lonsdale—not having his works at hand to refer to—but the following is taken from M'Coy's "Palæozoic Fossils":—"Polypidom calcareous, cellular, forming a conical or fan-shape expansion of radiating branches, interstices connected by transverse dissepiments; exterior surface of branches rounded, covered by dense minutely porous layers; inner surface with a keel along the middle, separating two rows of mouths of short tubular cells, which extend a variable length obliquely downwards and inwards into the interior of the branch: dissepiments usually without cells, occasionally a row of small cells on the mesial keel. Non-celluliferous side formed internally of a layer of vertical capillary tubes." This genus was placed by M'Coy among his Family, Group MYRIAPORIDÆ, a group which embraced the genus *Retepora* of Lamarck; the *Elasmopora* of King; the *Glauconome* of Goldfuss restricted by Lonsdale; the *Penniretopora* of Prodomas; the *Acanthocladia* of King; together with the sub-genera *Fenestellina* and *Reteporina* of D'Orbigny.

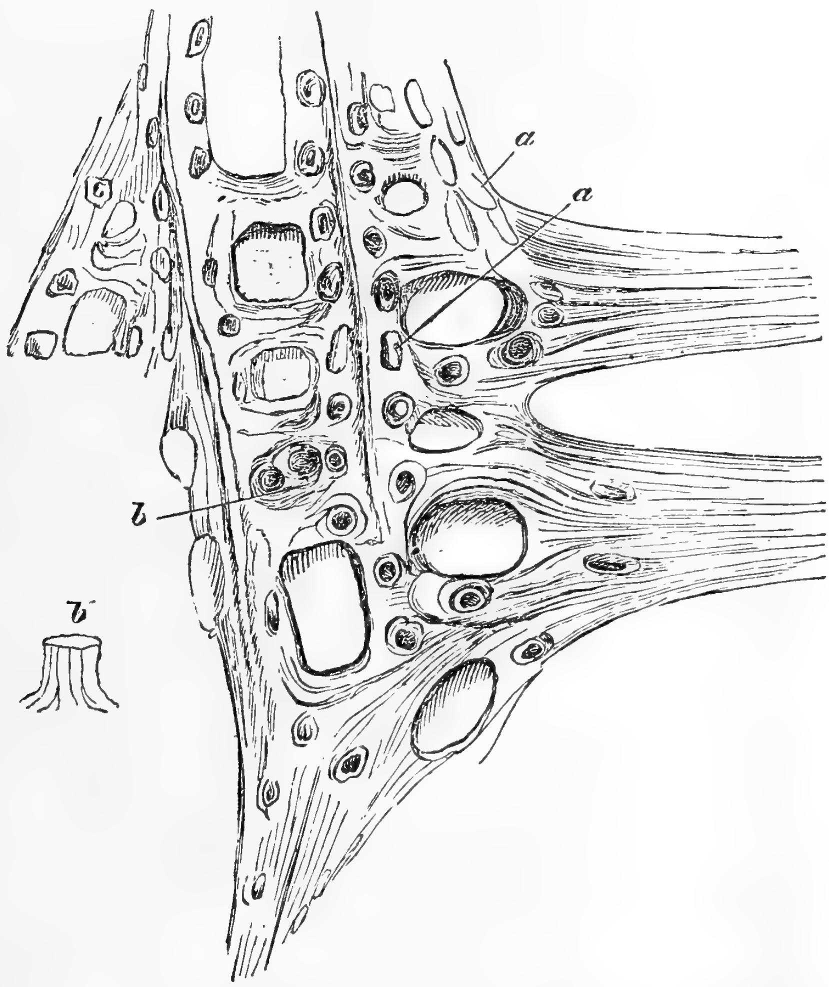


Fig. 205. *Fenestella* with lateral *Palæocoryne*. *a*. Bases of cells partially exposed. *b*. Immature development of Fenestrule with *Palæocoryne* (*b*) on reverse. The wider openings are the fenestrules, very irregular in shape and size. The specimen is upside down, to show the connection on the branches. (Natural size, slightly over ⅛ of an inch.

The first recorded appearance of this genus is in the Bala beds of the Lower Silurian series. In Morris's Catalogue, and also in Jukes's "Student's Manual," 1857, it is recorded as appearing in the Upper Silurian, in company with many other forms of Polyzoa. In the later edition of the Manual this may have been corrected, but I have not seen it. But in Morris's earlier Catalogue, which he began in the 1st volume of the *Geologist*, *Fenestella subantiqua*, D'Orb., and *F. Milleri*, Lonsdale, are given with the Lingula, Llandello, and Caradoc or Bala Bed fossils.

From either the figures or even the specimens, it is very difficult to make out the true character of *F. Milleri*. The habit of the species as impressed upon the Bala shale is peculiar and characteristic. It is partially flabelliform, but not universally so, as some of the branches cross and recross the under ones; thus obliterating the true character. The interstices are thin, and according to the description, the dissepiments are narrow and slender, and two lines apart. The fenestrules are five or six times longer than wide, with about twelve pores to the fenestrules. If this be a true description of the species, *F. Milleri* is a marvellous specimen of the earlier *Fenestella* group. *Fenestella Lonsdalei*, D'Orb., is figured in *Siluria*, and is given by Morris in the earliest, as in the latter catalogue. It is found in the Dudley limestone as well as in the lower beds, and if the synonyms be true, the species had a very wide range, as it is figured as an American species as *F. prisca*, and Morris, in his catalogue, gives *F. prisca* as a synonym of the species. The figure before me is cup-shape, attached by a broad base to some foreign object. The outline of the margin of the cup-like form is entire, and the poriferous face will be on the inside, like modern species of *Retepora* and *Hornera*. It seems to be a good species, and habit alone would be a sufficient character. *F. sub-antiqua*, D'Orb., is another *Silurian Fenestella*; but among synonyms of this are given *F. antiqua*, Lonsdale, *Retepora antiqua*, Goldfuss, and *R. membranacea*, Phillips: it may be a fragment of some larger specimen of *F. prisca*. D'Orbigny's species, as recorded and described in his Palæozoic Fossils, has a corallum very slender, with straight interstices, seven or eight of these measuring only two lines; the dissepiments are thick, and the fenestrules are rectangular or oblong, about three lines longer than wide. The pores are small, thick, with prominent edges, their own diameter apart, and six or seven to the length of the fenestrules. *F. reticulata*, Lonsdale, is a species that has been often confounded with Hisinger's *Retepora*, so much so, that M'Coy draws attention to the fact, acknowledging that it is scarcely possible to determine the specific character, as no information is given relative to the pores. Yet, as his species of *Retepora Hisingeri?* agrees in some particulars with the original, he would even add confusion to the confusion, and name it *R. retiformis*, even though Mr.

Lonsdale had applied the term to "a very similar corallum, which he, however, places with the genus *Fenestella*, and figures with only the two rows of pores usual in that genus."

F. patula, M'Coy, and *F. rigidula*, M'Coy, are good forms and very well described. The corallum of *F. patula* is small and semicircular, about half an inch in diameter. The interstices are broad, strongly carinate, slightly flexuous; the dissepiments are strong, and the fenestrules are a little wider than the interstices; the pores are large and prominent, about 3 or 4 to length of fenestrule. Its general features and character are very much like some of the smaller species of the Carboniferous limestone. The figure of *F. rigidula* is peculiar and striking, and it much resembles some of the Devonian species of Nicholson.

The following, however, is M'Coy's note on the synonyms of the several species:—

"*Fenestella antiqua*, Lonsdale = *F. subantiqua*, D'Orb.

F. antiqua, Goldfuss, is a distinct Devonian form.

F. prisca, Goldfuss, Silurian = *F. rigidula*, M'Coy.

F. elegans, Hall, Silurian = *F. rigidula*, M'Coy.

F. assimilis, Lonsdale, Silurian."

My list contains the names of three other forms. Dawson describes one by the name *F. Lyelli*, and Hall figures and describes two other species from the Clinton series of America,—*F. cribosa* and *F. tenuiceps*. There are figures of these species, I believe, in Dana's Manual.

I could not pretend to give anything like exactness to my review of the Silurian species of *Fenestella*. To say that the whole of the descriptions are very foggy, would be perhaps vulgar denunciation, but it would be nevertheless a fact. And before altering my formerly written paragraph, which was less sweeping than this, I have gone over again the whole of M'Coy's figures and descriptions. These are good so far as they go, but they do not come up to a proper analysis of the specific characters of the genus which modern biological, or even palæontological studies demand. Too much dependence has been placed upon the isolated fragments, which give only a partial view of the true ideal of specific type. In reviewing the Carboniferous *Fenestella* I shall be able to make this more clear.

Attercliffe, Sheffield.

(*To be continued.*)

[I should be glad to correspond with any student who has described or undescribed species of *Fenestella* in his cabinet, for the purpose of more accurate identification.]

COTONEASTER VULGARIS.—Could I ascertain whether this plant still exists on Great Orme's Head? The habitat I have down for it is, on rocks above the copper-mines. Along with two friends I worked the locality well, without avail, last month: probably it has got exterminated.—*H. T. G.*

HOLIDAY RAMBLES IN ST. OUEN'S BAY.

"SHALL it be Scotland or Jersey?" was the question put when arranging for a botanical tour; and though the flora of Clova, Glen Isla, Braemar, and the Grampians is sufficient in itself to make a holiday enjoyable, but when the additional advantages of lovely scenery and health-giving mountain breezes are added, it must indeed be a rich and peculiar flora to outweigh them; but possibly it was the long monotonous spring, with its absence of sun, that caused the Channel Islands to exert a spell so magnetic that not even the presence of the "silvery streak" was sufficient to break or neutralize its influence. So, having prepared for work by spending a day among the oaks of Whittlebury Forest, whose natural history has yet to be written, and glorying in another at Kew, we proceeded with considerable misgivings to cross from Southampton by a passage whose horrors had been sufficiently dwelt upon by candid friends; but, thanks to the soporific effect of the daily literature we had assimilated, we slept a dreamless sleep as we passed through the Solent and the chops of the Channel. Arriving at St. Helier's, in Jersey, we noticed the slopes of Fort Regent were brilliant with *Medicago maculata*, *Silene Anglica*, *Linum angustifolium*, *Tragopogon porrifolius*, *Sedum Anglicum*, and two or three specimens of *Gladiolus*, which had established themselves there. But it would be wearisome to give in detail the various plants seen on the different days spent in Jersey; sufficient to say, that, having beautiful weather we visited the rocky Corbières, home of the seabirds, enjoyed the delightful breezes on the samphire-covered cliffs of Pleinmont, the only Jersey locality for *A. capillus veneris*, admired the ivy-covered castle of Mont Orgueil, the shady lanes of St. Saviour's, home of *Arum Italicum* and *Sibthorpia*, and had taken the rather noisy coach-rides by Beauly Bay, with its view of sunny France, and the romantic gardens of Rozel, not to speak of the sea-bathing, which the firm sands and clear water render so pleasant, and the entomological hunts after *Thecla rubi*, *Cinxia*, *Edusa*, *Cardui*, and *Daplidice*, on the hot slopes of Noirmont Point and Greve de Lecq; while the enormous cow-cabbages, the fig-trees, and extensive vineries had been properly inspected. So, in order to give some idea of the peculiarly rich and extensive flora of Jersey, one day shall be used as a sample, comprising, as it did, some of the best and most typical plants. Its route may be shortly given as follows: from St. Helier's to Beaumont, thence to St. Ouen's on to L'Étac, returning by St. Ouen's Bay to La Moye and St. Brelade's. The distance walked would be from 24 to 26 miles. The success of the day was owing to the company of Mr. Piquet, who is compiling a new flora of Jersey, and the previous reading up of Babington's "Flora Samicæ." Shortly after leaving the nautical-looking station of St. Helier's, the rail, which

runs round St. Aubyn's Bay, was bordered with *Borago* and *Anchusa sempervirens*, common viatical plants in Jersey, followed by great quantities of *Œnothera odorata*. Dismounting at Beaumont, and walking to Bel Royal we found *Alyssum maritimum*, and then visited St. Peter's Marsh, where *Ranunculus ophioglossifolius*, *Cyperus fuscus*, and *Isnardia palustris*, formerly grew, but with the drainage of the marsh and its subsequent cultivation these rarities have disappeared. Mr. Piquet, however, pointed out the exact spot where he had last gathered the Ranunculus. At Bel Royal, in Professor Babington's locality, we gathered *Herniaria subciliata*, growing in straggling dark green patches, not unlike *Thymus Serpyllum*. Near it we also found *Allium spherocephalum* and *vineale*, *Silene conica*, whose prettiness is lost by drying, and *Œnothera* in great plenty. Passing through one of the shady lanes we gathered *Scrophularia Scarodonia*, which takes the place of our *nodosa* and *aquatica*, the two latter being rare in Jersey. On emerging into the bright sunlight we noticed the pretty *Lotus hispidus* and *Sedum Anglicum*, while the gardens of the nice little villas were blazing with *Mesembryanthemum* and *Gazonia*. Nearing St. Peter's, on a shady wall we came upon the Jersey Fern, *Gymnogramma lentophylla*, in abundant fruit, but losing its colour, May being the month for it in perfection. On the way to St. Ouen's Manor,—about Vinchelez, where we had previously caught a fine specimen of the Jersey Lizard, *Lacerta viridis*, before it threw off its tail, as did another we caught near St. Brelade's. In these oak-shaded lanes entomologists possibly would have been pleased by the strong odour emitted from hundreds of the goat caterpillars which infect and destroy many of the trees about here; but to us the smell of *Allium triquetrum* that haunted our vasculi was deemed preferable. Gratefully accepting the invitation to visit the Manor House, we went over one of the ancient homes of Jersey,—the ancestral seat of the Carterets; and had we been archæologists, we might have reported upon the quaint oak carvings and mullioned gables; but being only botanists, we most enjoyed the view over the island, down the well-wooded valley to the coast of St. Ouen's wide-stretching bay, and the pond, dear to botanists, *the ultima Thule* of our journey: while, above us, the grand old chimneys, covered with white and pink snapdragons, and the thatch-roofed outhouses, covered with such profusion of *Cotyledon*, surpassing any previously noticed,—not excepting Pandy Mill, delight of artists, the rocky lanes of Carmarthen, or the peat-topped walls of county Mayo. Leaving St. Ouen's we came upon a marshy piece of ground, where *Lythrum hyssopifolium* was plentifully growing, though, of course, not in flower. *Ranunculus hirsutus*, *Orchis latifolia*, *Bartsia viscosa*, and *Hypericum elodes*, also occurred. Nearing L'Étac, the roadsides were bordered with *Sinapis incana*, and a wet meadow was adorned with the rich purple *Orchis laxiflora*. *Chenopodium murale* occurred in the village, *Atriplex Halimus* being used as a hedge-plant.

St. Ouen's Bay is about six miles long, and is bordered with sandy tracts cultivated wherever possible, in some cases potatoes being planted in the actual sand, where *Carex arenaria* and *Festuca rubra* are agrarian weeds; but the uncultivated portions shone as a field of gold with *Raphanus*, *Brassica*, *Cheiranthus*, *Sinapis incana*, and other Cruciferæ. The roadsides yielded *Lotus diffusus*, *Allium vineale*, *Silene conica anglica*, *Trifolium striatum* and *subterraneum*, with stems 18 in. high; while, growing among the silvery abundance of the long-awned *Bromus maximus* and *Festuca uniglumis*, appeared *Medicago minima* and *Armeria plantaginea*, with other sand-loving plants.

On the hot toilsome walk across fields of small dimensions enclosed by stone walls of rickety structure, specimens of *Orchis laxiflora*, *Bartsia viscosa*, *Cyperus longus*, and *Œnanthe crocata* were noticed. An exploration of the shingle was next attempted, when a solitary specimen of *Crambe*, a very rare Sarnian plant, was seen. *Euphorbia Paralias* was frequent, and is occasionally frequented by the larvæ of *Sphinx Euphorbii*. *Diotis maritima* was not plentiful, but *Atriplex arenaria*, *Salsola kali*, and *cakile* were very common. Standing by the shingle, and looking over to the sand dunes, a beautiful sight was presented by the great quantities of *Matthiola sinuata* in magnificent bloom, growing with the glaucous *Eryngium* and glaring golden *Brassicæ*. By the second Martello tower a nice patch of *Lagurus ovatus* occurred, and plenty of *Orobanche amethystea*, while here and there might be seen bleached skeletons of *Mibora minima*. Between the sea and the hills appeared great patches of *Centaurea aspera*, the lower flowers of which were only in bloom. On reaching the hill slopes, a complete mass of beauties presented themselves, so that the exclamations of admiration, which had been popping off at no distant intervals all day, now came by volleys; and down we lay among thousands of *Dianthus prolifer*, *Linum angustifolium*, *Orobanche cœrulea*, *Centaurea aspera*, *Centaurea paniculata*, and *Scabiosa maritima*. Next came a descent to St. Ouen's Pond, where, having seen *Cladium Mariscus*, we came upon *Scirpus Tabernæmontana*, followed by its rarer relative *pungens*, and eventually *maritimus* and *pauciflorus*; then came the prettily-veined leaves of *Potamogeton plantaginens* and the fugacious flowered *Alisma ranunculoides*; after which a long search was made for the leaves,—it was too early for the flowers,—of *Spiranthes æstivalis* and *Epipactis palustris*. On the road to the Corbières, *Kœleria cristata*, near *albescens*, *Corynephorus canescens*, *Radiola milligrana*, *Trifolium arvense*, *Lepturus filiforme*, *Convolvulus Soldanella*, *Bromus Lloydianus*, and *Schlerochloa loliacea* were found, but *Solanum miniatum* searched for without

success. On the hill-slope below La Moye came a tract of ground covered with *Sarothamnus prostratus*, on which grew some fine *Orobanche major*. About here Mr. Piquet had a week previously found *Linaria Pelisseriana* in plenty, but as we had searched without success a few days after, were not very sanguine about adding it to our store; but, however, we carefully searched among the *Cuscuta*-covered *Ulex* and prickly *Ruscus*, and then, as these became less frequent where the hill-side was purple with *Echium violaceum*, and then higher still among myriads of *Sedum Anglicum*, *Juncus capitatus*, *Trichonema columnæ* in fruit, *Radiola milligrana*, *Helianthemum guttatum* surrounded with its quickly-falling petals, *Silene conica*, *Lotus angustissimus*, *Aira præcox*, and *Euphorbia Portlandica*, but no *Linaria*. Some Jersey cows were browsing eagerly about the gorse clumps; and as Mr. Piquet said they are very fond of the *Linaria*, its disappearance was at once laid to their charge. As no ready means of revenge presented itself, another search was made, this time rewarded with *Asparagus prostratus* and *Asplenium lanceolatum*, and at last, with the real Simon pure in fruit. Having mercy upon it, we selected only a scrap or two, and, elated, set off at a fast rate for St. Brelade's, where suddenly we had to halt to avoid the desecration of trampling upon a few hundreds of *Trifolium strictum* growing some 10 in. high. Descending to St. Brelade's, *Silene nutans*, *Silene quinquevulnera*, *Sedum dasyphyllum*, and *Delphinium Ajacis* were picked. The road to St. Aubyn's was bordered with *Silene nutans* and *Scrophularia Scarodonia*; while, with vasculi, hats, books, and hands full of specimens, we trudged along up the sandy road, scarcely deigning to notice *Polycarpon tetraphyllum*, *Oxalis stricta*, *Epilobium lanceolatum*, and *Hieracim pilosissimum*, reaching St. Aubyn's in time for the train to bear us round the beautiful bay to St. Helier's, where something more solidly sustaining than cocoa had to be discussed previously to putting in press our numerous and rich collection.

G. C. DRUCE.

AN AUTUMN RAMBLE IN EPPING FOREST.

PART I.

By DR. DE CRESPIGNY.

To procure specimens of a late-flowering and uncommon Chenopod (*C. urbicum*) from a locality on the borders of Epping Forest, we had lately occasion to make an excursion in that direction, when the opportunity was taken advantage of for a ramble through the shaded dells and broken uplands of the forest in search of fungi, which are always to be found there on the setting in of the autumnal rains, in great variety and abundance. Many clearances have been made of late years in the neighbourhood of Walthamstow and Wanstead; consequently, although there are still many unenclosed patches of woodland thereabouts, of which the most considerable extends southwards of Wanstead, we can hardly consider ourselves fairly within the precincts of the forest proper until we have left Woodford behind us. Traversing, then, one of these detached woods—that which lies between this place and Walthamstow,—we

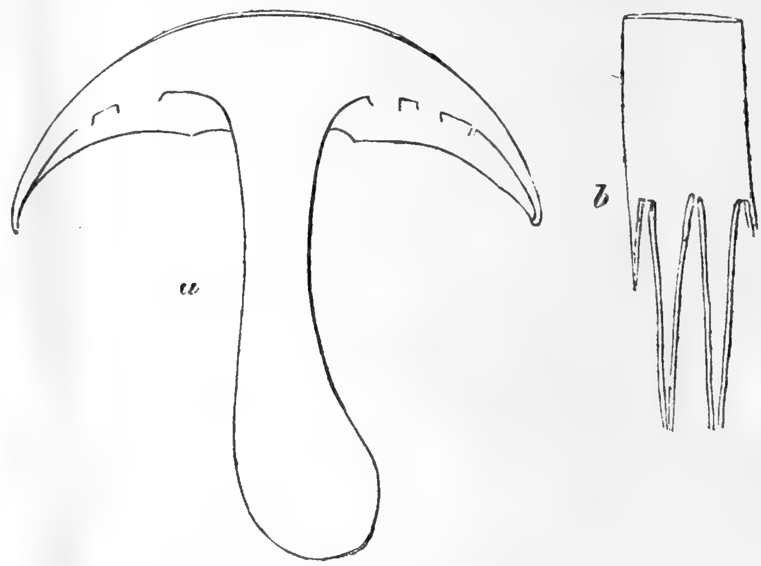


Fig. 206. *a*. Vertical section of an Agaric (*Tricholoma nudus*). *b*. Ditto of lamellæ of ditto showing the trama continuous with the pileus.

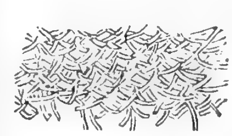


Fig. 207. Filamentous Trama of an Agaricus (*Amanita rubescens*.).

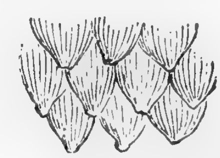


Fig. 208. Persistent Scales of the Cuticle of *A*. (*Lepiota*) *rachodes*.

Fig. 209. Section of *A* (*Pleurotus*) *ulmarius*.

Fig. 210. Decurrent lines and ring on the stem of *Amanita rubescens*.

turn down the Chingford road into the hollow below, where a lane, right, leads into a copse bordered by a rill and a narrow strip of pasturage; beyond, left, is the warren and farmhouse, well known to excursionists as Queen Elizabeth's Lodge; onwards, a footpath to High Beech Hill. Forcing our way in this direction, at one time with difficulty through tangled and almost impenetrable thickets, at another crossing some open grassy glade, or stretch of

pollard oak and hornbeam, where bramble and blackthorn scrub gave place to an undergrowth of bracken, and where progress was easier and less irksome, we gathered as we went anything and everything in the shape of fungus we could see, retaining, however, only two or three specimens of each kind. From the "King's Oak," near High Beech, the high road to Epping traverses the very heart of the forest:

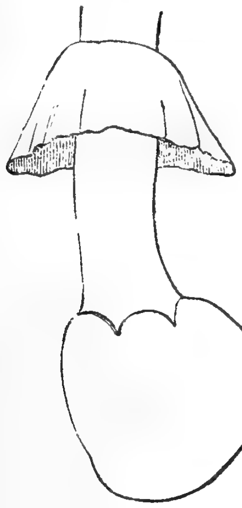


Fig. 211. Ring, Bulbous Stem, and Volva of *A. (Amanita) phalloides.*

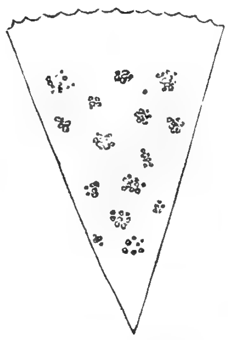


Fig. 212. Cuticle of *A. (Amanita) rubescens,* showing the scattered mealy warts of the cuticle.

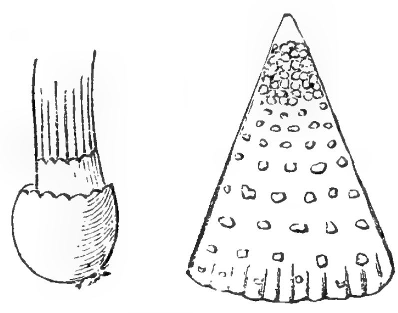


Fig. 213. Bulbous Stem and warted Cuticle of *A. (Amanita) Ceciliæ.*

Fig. 214. Section of fistulose Stems of *A. (Hypholoma) fascicularis.*

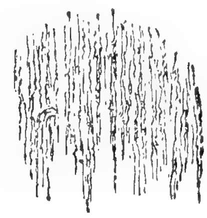


Fig. 215. Floccose Trama of a] *Cortinarius (Trichloma) violaceus.*

Fig. 218.

Umbonate and Fibrillose Pileus of an *Hebeloma.*

Subumbonate Fibrillose Pileus of a species of *Hebeloma.*

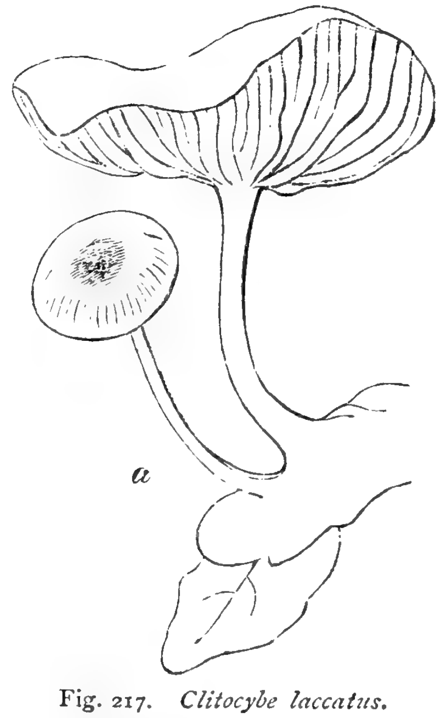


Fig. 217. *Clitocybe laccatus.*

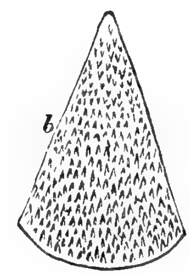


Fig. 216. Mealy subsquamulose Pileus of *Clitocybe laccatus.*

Fig. 219. Pileus clothed with innate hairy scales of *Pholiota aureus* (magnified).

trudging onwards, first on one side and then on the other of this road, another central station is reached —"The Wake Arms," and where it is crossed by the road from Waltham Cross to Theydon Bois; hence it is not far from an ancient intrenchment, called "Amesbury Banks," and whence we retraced our steps through dense thickets and interminable groves of lopped beech and other trees, until we reached the picturesque slope which rises behind Loughton.

As anticipated, the heavy rains of August had produced a more than usual abundant crop of fungi; and on sitting down next day to examine and sort the contents of our pockets, hat, and vasculum, we felt fairly bewildered at the sight of the spoils, and hurried multitudinous entries in our note-book.

To take them scientifically, and in proper order of sequence, let us commence with the Agaricini; those with a gilled or plated hymenium: these, of course, were the most numerous, and were easy to separate from the rest. Referring to "Berkeley's British Fungology," we find that they are all included in fifteen genera, of which some three or four are rare, or have but few representatives in England; on the other hand, the Agarics proper are so numerous as to comprise twenty-seven sub-genera, arranged in five sections, according as the colour of the spores is white, salmon-coloured, tawny or ferruginous, purplish or brown, and black. The characteristics

of the genus are persistent membranous gills and a filamentous trama continuous with the pileus; but those of the sub-genera are very miscellaneous and confused: differences in the character of the velum or veil, whether present or present only in the form of an annulus, or wanting entirely in any shape; confluence or otherwise of the hymenophorum with the stem; decurrence or other peculiarity of the lamellæ; peculiarities of the stem, of the pileus, of its margin; presence of a volva or absence thereof. In one sub-genus there is no stem—*Pleurotus*. Of this we gathered a specimen from the dead trunk of a tree: the gills are narrow, and margin of the pileus remarkably incurved. Illustrative of the scaly-cuticled sub-genus *Lepiota* we found a few specimens of *L. rachoides* growing singly in a hedge; besides this peculiarity, it has a stem furnished with an annulus, and is altogether a pretty little plant. Not unfrequently *A.* (*Amanita*) *rubescens* was met with, rather a handsome fungus with a brownish warty cuticle and white gills, bulbous and ringed stem: the rubescent character is not very decided, sufficiently so, perhaps, to warrant the use of the term; the bulb and stem when broken exhibited this characteristic more clearly than the pileus: edible.

Less frequent was another,—not edible as this, but very poisonous species, *A.* (*Amanita*) *phalloides*, with stem strongly ringed, and a bulb furnished with a volva free above; white, except the upper part of the pileus, which has a yellowish tinge. A ringless but bulbous fistulose-stemmed *Amanita* we found in *A. Ceciliæ*, also furnished with a volva, and with a pileus more persistently warted than that of *A. rubescens*. It is a much smaller species, and the brownish colour of the pileus is of a colder shade, greyish or mouse-coloured. *A.* (*Tricholoma*) *nudus* we observed only in one place, a handsome, but probably very dangerous mushroom: there was one small patch of it, three or four growing closely together (fig. 206). Pileus obtuse, moist, pale violet shaded with brown; gills and short, thick bulbous stem of a beautiful violet throughout. The warted scarlet pileus of *A. muscarius* we looked for in vain,—one of the handsomest, at the same time one of the most poisonous of its tribe. (*Tricholoma*) *A. personatus* is more frequent, but grows singly, here and there, in open grassy places: the pileus is convex, obtuse even, moist and of a pale ochre-colour; gills dirty white, stem ringless, firm, and covered with a stain of pale violet. On the stumps of decayed or felled trees was the well-known *A.* (*Hypholoma*) *fascicularis*, with its dull rufous-coloured pileus, passing into yellow at the borders, yellow fistulous stems, and greenish-grey gills: and in many parts of the forest growing in patches, often of a circular form, *H. sublateritius*, much like the preceding species.

Examples of a section of Agarics (among our specimens), characterized as having pilei clothed with fibrillose scales, usually umbonate (*a*), or sub-umbonate (*b*), and fibrillose stems, we have in two kinds of *Hebeloma*; the colour of the cuticle in *a* is golden brown: and in *A.* (*Clitocybe*) *laccatus* we have a pileus the very reverse of umbonate, viz., the umbilicate form: it grows on dead leaves abundantly in the forest; colour variable, from flesh-coloured to cinereous grey and pale cobalt. *Clitocybe candicans* is also plentiful. On the margin of a pond, not far from the "Wake Arms," we obtained several fine specimens of *A.* (*Pholiota*) *aureus*, a mushroom remarkable for its pileus brilliantly coloured of a golden tawny hue, and, examined with a lens, sprinkled with closely adpressed or innate hairy scales of an orange colour, which impart no doubt a brilliancy to the plant in its living state, but which fades away when no longer fresh.

Last, and not by any means least of the Agarics, is a tall species of *Collybia* (*C. radicatus*), plentiful in the wood behind Loughton. It is furnished with a long tap-root, the stems at least six inches long, slender, and tapering upwards; pileus of a greyish brown, smooth, moist, plane, and umbonate.

(*To be continued.*)

A GOSSIP ABOUT NEW BOOKS.

On nothing does a "war fever" leave its mark more impressively than scientific literature. The tide of true progress is then stemmed, if not rolled back. The literary history of the last two years proves how few important works of science have issued from the press. And yet that period has been marked by scientific discoveries of the most important and even sensational character. It is the epoch of the Telephone, the Microphone, and Phonograph; of the Radiometer, Otheoscope, and other instruments, which revealed to us the molecular mysteries of matter.

It is with much pleasure that we turn to a short notice of a few books which have for the last month or two been accumulating on our library table. The short space at our disposal does not enable us to do that justice to some of them which they require. "Tropical Nature," by Alfred R. Wallace (London: McMillan & Co.), deserves a leading place in any notice of new books. The volume consists of a series of essays, chiefly relating to animal and plant life in equatorial regions, speculations as to the colours of birds and animals, flowers and fruits, and how they have arisen through the process of natural selection. All are written in that delightsome manner which characterizes Mr. Wallace's other books. The chapter on humming-birds is one of the most charming ever penned by its original writer. That on the distribution of animals as indicating geographical changes is a remarkably clear piece of philosophical generalization. By this time most readers of natural history will have read "Tropical Nature," and our advice to those who have not yet had the opportunity is that they should

read it as soon as possible.——"West Yorkshire; an Account of its Geology, Physical Geography, Climatology, and Botany," by Messrs. James W. Davies and F. Arnold Lees (London: L. Reeve & Co.). This book contains much valuable work. Few counties are more interesting geologically than Yorkshire, and many books and papers have been written upon it. All of these have here been duly arranged chronologically, and the authors always refer to such of their literary predecessors as have furnished them with material. The geological portion is written by Mr. James W. Davies, the hon. sec. of the Yorkshire Geological Society, and all geologists will acknowledge that he has done his work conscientiously and well. The second part, devoted to physical geography and botanical topography, is the joint work of Messrs. Davies and Lees. The arrangement of the material is most excellent, and so clear and suggestive that the reader is enlightened instead of being perplexed by its abundance. Numerous maps and engraved sections assist the text, and these are of excellent execution. The geological structure of Yorkshire is treated of in detail, from the Lower Silurian beds to the Glacial series. The physical geography and topographical botany then follow in order, and one sees almost at a glance the relation between plant distribution and the physical geography of the valleys in which they occur, or the geological structure of the underlying rocks. A handsomely got-up volume of upwards of 400 pages thus represents a most creditable scientific industry on the part of the authors.

The new term of *Physiography* (as Physical Geography is now called) has called forth a series of "manuals" devoted to its exposition. How important is even an outline knowledge of nature has been shown by the success of Huxley's little book on this subject. There is always the danger of causing shallow-minded students to imagine they have nothing more to learn when they have acquired a well-defined idea of natural phenomena as a whole; and on that account we object to "physiography." But if books have to be written on this subject, they may as well be in good hands; and we are therefore pleased to notice "The Physical System of the Universe," by S. J. Skertchley, F.G.S. (London: Daldy, Isbister, & Co.), which is intended as a manual of physiography. It is a book, however, which will delight those who do not intend "going in for examination" more than those who do, for it is a well-written and very clear outline of the universe as a whole, and of the unity of natural forces. We know of few recent books which comprehend so much in so limited a space. All the recent discoveries in physical, natural, and geological science are included in Mr. Skertchley's book. It is a work which we hope will be read with the same pleasure that we have ourselves derived from it.

"A Science Primer," by the Rev. Dr. Macvicar (London: W. Blackwood & Sons), although a small book in comparison with those above mentioned, is a remarkable one in many respects. It professes to deal with "the nature of things." Its author is a man possessed of great ability, extensive reading, and a brilliant power of speculating. There are many subjects briefly discussed, especially those relating to molecular physics, which strongly impress us by the undoubted ability and originality of view with which they have been treated. Our readers will not always agree with the author, but few will come away from this suggestive little book unimpressed with new ideas.

"The History of Glanville's Wootton," by C. W. Dale (London: Hatchard, Piccadilly), is a detailed account of the archæology, zoology, and botany of a district in Dorset, after the manner of White's "Selborne," only arranged in chapters, instead of being given to the world in the form of letters. The book is very well got up, with capital paper and in clear type, and the few photographs which illustrate it are excellent. As for the rest, the work consists of lists of animals, vertebrate and invertebrate, and of plants, phanerogamous and cryptogamous, which have been found in the district of Glanville's Wootton. Mr. Dale has devoted much time and careful labour to his task, and as a consequence has given a very valuable little monograph to the world.

"A Handbook for England and Wales" (London: John Murray), which should give, alphabetically arranged, a short and trustworthy account of every town, village, and place of importance, with all relating to them of archæological, geological, botanical, or geographical interest, was a happy idea. A handier book of reference could hardly have been prepared than has been now compiled. All depended, however, upon the author and his ability to select just such material as would be valuable to the traveller, tourist, or student. We are happy to say that this has been done in the present work, and that, having tested, from personal knowledge of numerous places referred to, the pains taken by the author to insure accuracy, we believe it to be one of the best books of its kind which the well-known publishers have issued.

"Holmes's Botanical Note Book," by E. M. Holmes, F.L.S. (London: Christy & Co.), may be utilized by the student as a means of acquiring a practical knowledge of botany. It contains diagrams showing the parts of flowering plants, directions for examining plants, the microscopical examination of plants, directions for describing plants in schedules, and a glossary. The schedules, however, form the principal part of the work, and these may be obtained separately of the publishers. The printed head-lines oblige the student to note down every feature of a plant, and in this way he will soon learn to look out for particulars which are too frequently shunned, because deemed troublesome to detail. We are much pleased with Mr. Holmes's note-book, and heartily recommend it to students.

"A First Catechism of Botany," by John Gibbs

(London: Simpkin, Marshall, & Co.). This is a new and enlarged edition of a very noteworthy little book, written by a botanist who is a frequent contributor to our pages. We have before expressed our liking for the book, and are glad to see it revised and enlarged. All young botanists would do well to get it.——"The Creation of Moses and Science in Harmony," by Dr. Alex. Stewart (London: Elliot Stock), is another of those laboured productions in which so much intellectual force is thrown away in attempting to harmonize what have never been disturbed, except by men themselves. They frequently consist of bad geology and weakened theology, and are usually unsatisfactory. Correct science needs no harmonizing: incorrect science soon gets corrected. Meantime the great truths which theology has in its keeping have a sphere entirely apart from scientific investigation. As might be expected, the greater part of the book under notice is devoted to demolishing the theory of evolution. Would that such writers were wise in time! No "reconciliations" would then be needed.

To turn from these unsatisfactory subjects to note the appearance of the *ninth* edition of Proctor's "Half-Hours with the Stars" (London: Hardwicke & Bogue), is a pleasant change. The twelve plates of the maps are new, and in bolder execution, so that the astronomical student is considerably aided thereby. It augurs well for the spread of astronomical science when books of this class are so well received and largely circulated.

A capital little book on human physiology, simply but attractively written, is Mrs. F. Fenwick Miller's "House of Life" (London: Chatto & Windus). It is a work which should be in every family library, not to lie idly on the shelves but to be read by every member.——"The Sight, and how to Preserve it," by Dr. H. C. Angell (London: Hardwicke & Bogue), is another work of a similar kind, bringing within intelligent knowledge those parts of our own frames about which we have hitherto been in such culpable ignorance. Perhaps no sense is so much valued by us as that of sight, and there is scarcely any other so abused. Take one hundred people whom nobody would call other than *educated*, and let them answer a few questions as to the structure of the eye and the nature of vision, and perhaps not five would pass the examination entitled to an elementary certificate! This ought not to be; and it is pleasant to see the leading medical specialists devoting what little spare time they have to popularly instructing the masses in the subjects to which the former have devoted long and useful lives. Nothing could be more understandable, more practical, or more useful, than Dr. Angell's remarks on "The Sight and how to Preserve it," and everybody with eyes ought to read them.

"Nutrition in Health and Disease," by J. H. Bennet, M.D. (London, J. & A. Churchill). This is the *third* edition of a valuable work, chiefly written for public rather than special readers, but which the latter cannot fail to estimate very highly. The title is a very happy one, and rightly expresses the character of the work. Its aim is the same as that of the two little works just mentioned,—the endeavour to make people acquainted with their own bodies, and what is taking place in them every hour of the day under the name of "nutrition."——"Phosphates in Nutrition," by M. F. Anderson (London: Baillière, Tindall, & Cox), is a work of a similar important nature. Its endeavour is to show the importance of certain inorganic materials in the food, and their functions in the tissues. In this way the author's views lead him to some novel explanations of the causes of certain diseases hitherto but little understood. The chapter on the "Mineral Theory of Wasting Diseases" is especially noteworthy.

"English Folk-Lore," by the Rev. T. T. Dyer, M.A. (London: Hardwicke & Bogue), cannot fail to be a popular and widely-read book. "Folk-Lore," or the wisdom of the common people, as expressed in their proverbial and other sayings, has of late years been a fruitful study. All of us are acquainted with some of these sayings, and their quaint utterance frequently carries us back to the days of our childhood. There are scarcely any natural phenomena which have not been thus noticed; whilst the pages of our best poets frequently sparkle with the richest and quaintest of these gems of folk-lore. Mr. Dyer's book is a very attractive-looking volume, both outside and inside, for it has been given to the world in a handsome cover and good paper and print,—the very auxiliaries to make such a work successful. The author is very happy in his style, for it is light and airy without being flippant. Evidently he is interested to his subject, as he sometimes rises almost to enthusiasm. We have chapters on the folk-lore of plants, birds, animals, insects, and reptiles; the moon (a fruitful source of old-world sayings); besides half a volume relating to birth, death, marriage, &c.

MICROSCOPY.

THE CONGRESS OF MICROSCOPISTS, held at Indianapolis, Ind., August 14th, 15th, 16th, and 17th, was a great success as regards numbers present and results arrived at. Delegates were in attendance from all parts of the Union, sixteen societies being represented by delegates. Many papers of value to the working microscopist were read. Amateurs had ample opportunity to profit by the work of older workers. Results were compared, and many delightful acquaintances formed. Dr. R. H. Ward, of Troy, N.Y., was elected President, and Mr. H. F. Atwood, of Chicago, Secretary. One evening was devoted to a "conversazione," at which the public attended, and were duly pleased with the popular slides which were chosen for their entertain-

ment. Perhaps the most enjoyable part of the meeting were the "séances," held each evening in the various rooms in the hotel. No such gathering of microscopists could come together and not bring about a discussion on "Angular Aperture"; high and low angles were both well represented, the former by such well-known authorities as Prof. J. Edwards Smith and Dr. Geo. E. Blackham, while Prof. Romyn Hitchcock, of New York, supported the latter. While the question will remain an open one for long time yet to come, it is but fair to say that many gentlemen who had always used low-angled lenses prior to the meeting, went away essentially high-angled men. Several of the American dealers made fine displays of microscopes and objectives. Of the English manufacturers, Beck & Crouch were fully represented through their respective American agents. Before the congress adjourned, the "American Society of Microscopists" was formed, Pres., Dr. R. H. Ward, Troy, N.Y.; Sec., Henry Jameson, Indianapolis, Ind.; Treas., H. F. Atwood, Chicago, Ill. The next meeting of the new society is to be held in August, 1879, at Buffalo, N.Y., and from its auspicious beginning, and the enthusiasm manifested by its members, it is fair to predict that the future meetings will be of more than ordinary interest.

MICROSCOPICAL SOCIETY OF LIVERPOOL.—The seventh ordinary meeting of this society was held at the Royal Institution, on Friday, the 11th October. After the ordinary preliminary business, a paper was read on "The Life History of a hitherto Unrecorded Septic Organism"; with drawings from life; illustrated by means of the Oxy-hydrogen Lantern, by Rev. W. H. Dallinger, F.R.M.S. At the conclusion of the meeting a conversazione was held, when the following subjects were illustrated :—"Algæ, Marine," T. C. Ryley; "Carchesium Polypinum," natural state, mounted, Isaac C. Thompson; "Diatoms," Charles Symes, Ph. D.; "Durio Zibetharinus, — decolorized leaf of from Borneo," polariscope, the President; "Oscillatoria," mounted slides and alive, the President; "Polyxenes lagurus," Rev. W. H. Dallinger, F.R.M.S.; "Pond Life," George Thomas; "Section of Wigan Coal," John H. Day; "Spores of Fungi," Rev. W. Bannister.

A REMARKABLE PHOTOGRAPH.—The "American Journal of Microscopy" for August, 1878, describes a marvel of photographic manipulation in the form of a micro-photo of the Lord's Prayer. Our readers are well acquainted with the ordinary micro-photographs of engravings, &c., and for which a power of 30 diameters is usually the extreme limit of amplification which can be used effectively, the higher powers destroying the sharpness of the outline. The above-mentioned photo is only $\frac{1}{100}$ of an inch square, or $\frac{1}{10000}$ of a square inch (one of the squares in Maltwood's finder would contain it four times), and will bear inspection with $\frac{1}{6}$ objective and B ocular. These slides are the production of Mr. Langenheim (of New York ?).

ZOOLOGY.

MARINE DREDGING.—I have collected for years on the Lancashire and North Welch coasts, and I thought I should like to try a fresh locality. Knowing the ruggedness of the coast scenery of the Isle of Man, I proposed making that place the theatre of my operations, and I can certainly say I never saw happier hunting-grounds for the naturalist. Anemones by thousands, Algæ, Red, Brown, and Green, in wonderful profusion; in fact, almost every department of Marine Zoology is well represented. I was enchanted, and determined that next year, if spared, I should devote a week or so to collecting. A friend of mine who brought some anemones back with him, sent for me to name them for him. Among a lot of *Actinia mesembryanthemum*, *Tealia crassicornis*, *Anthea cereus*, &c., I found one I had not previously seen, but which I had no difficulty in recognizing as *Bunodes gemmacea* (the Gem Pimplet of Gosse). It is a charming animal, well worthy of its name. It is still alive and healthy, having had two feeds of mussel. The only locality Gosse gives for this anemone is "the south-western and southern shores of England and Ireland, on exposed rocks and shallow pools between tide-marks." If this locality is new, I gladly record it for the benefit of brother naturalists. It is not uncommon even in Douglas Bay. In answer to "C. E. R.," I may say this anemone requires no peculiar treatment. It is easy to keep alive if the aquarium is in good condition; also, the best method of feeding baby anemones is to let them feed themselves, and they'll not starve. In fact, none of the animals in a large tank I had were fed for twelve months, and I can aver that there were no deaths, and the whole affair required less looking after. I am much obliged to "H. C. C. M." for description and figure of Tangle-dredge. I have no doubt it will be a very useful instrument to the marine zoologist. I was very sorry to hear of his want of success, but can readily divine the cause. Since the establishment of public aquaria there has sprung up at various parts of the coast quite an army of collectors. The locality he mentions is very familiar to me, having collected on its shores and dredged in its deep waters many times. The channel in the straits (north entrance) is very narrow, and runs close to the Anglesea shore, but my boatman took me to dredge on the low banks of mud, which I knew were exposed every tide, and it was only on showing him I knew better that I got my dredge down on prolific ground. I have tried many times to procure a "Ball's Naturalists' Dredge," but have as yet been unsuccessful; none of the London fishing-tackle-makers know anything about

it. Could you or any of your numerous readers tell me where I could get it?—*J. E. Lord, Rawtenstall.*

A Seal in a Trap.—A seal has recently been engaged in exploring the interior of Suffolk. It ventured up a dyke near Leiston, in Suffolk, and was shot whilst lying there. As one might have expected, it was a *young* animal, weighing just thirty pounds, and measuring forty-one inches in absolute length.

Living Beetles as Female Ornaments.—We hope the attempts to introduce living exotic beetles as female ornaments will fail, if only in the interest of the animals themselves. We read in a fashionable newspaper of one which has been adorning a lady's shoulders for six weeks, and subsisting for that period without food! The lady did not know (and probably did not care) how long it had been without food before she had it; and as it came from central America, it may have been some time. Are we so hard up for ornaments that we must resort to these aboriginal customs? They are understandable in the case of those African beauties who are obliged to dispense with any other dress, but we have not quite retrograded to that condition.

"Science Made Easy."—Under this title Mr. Thomas Twining has issued a series of six familiar lectures on all kinds of scientific subjects, but chiefly those bearing on economic industries. They are issued in shilling parts by Hardwicke & Bogue, 192, Piccadilly. The type is large, and pleasant to the reader's eyes; the illustrations of the very best and most effective kind. Science teachers and others interested in the spread of scientific education will find these "Lectures" invaluable. We should like to see them used in every Board School in the kingdom, and we would strongly advise such of our readers as are connected with those institutions, either as managers or committee, at once to obtain copies of these lectures, and endeavour by their means to lay that foundation of scientific instruction which to England, more than any other country, is absolutely indispensable.

Popular Science.—The *Popular Science Review* for October contains articles on "The Sand and Brittle Stars," by Professor Martin Duncan; "Coal and Colliery Accidents," by Mr. C. De Rance, F.G.S.; "The Radiolaria as an order of Protozoans," by Dr. Wallich; "The Eucalyptus globulus," by M. Betham Edwards; and on "The Extinct British Wolf," by J. E. Harting, F.Z.S.

Rare Birds.—From various paragraphs in last month's *Zoologist* we gather that the Hoopoe has been unusually abundant this year on the south and south-western coasts. Observers mention it as being seen at Chichester, in the Isle of Wight, and near the Land's End. It has also been seen near Gloucester. As one might expect, in most places the beautiful stranger was *shot!* Perhaps in time natural selection will endow rare birds with more sense than to approach the English coasts.

Provincial Natural History.—We have received a copy of Part 4, vol. ii., of the "Transactions of the Norfolk and Norwich Naturalists' Society," containing a most able address by the President, Mr. F. W. Harmer, F.G.S., which deals chiefly with the difficulties of the Darwinian theory, and is a capital defence of it against some recent attacks. It also contains papers on the Norwich crag, by Mr. Harmer; a list of plants found near Cromer, by Professor Babington; letters relating to the Natural History of Norfolk, by Mrs. R. Lubbock and Professor A. Newton; on William Arderon, an old Norwich Naturalist, by F. Kitton; notes on Norfolk Mammalia, by F. Norgate; Meteorological Notes, by John Quinton, jun.; Ornithological Notes, by H. Stevenson; and Heteroptera and Homoptera of Norfolk, by J. Edwards. The "Report of Proceedings" of the Norwich "Science Gossip Club" has also been forwarded to us, containing an abstract of all the papers read last winter, embracing a variety of scientific subjects, all ably and intelligently treated, together with the Address of the President, Mr. S. C. Sothern. This is a very popular society, and one which those young naturalists would do well to correspond with who wish to found an unpretending science club. Part 10 of vol. i. of the "Transactions of the Watford Natural History Society" is also to hand, containing index, list of members, &c.

The Kingfisher in London.—On Monday, 30th September, when crossing Westminster Bridge, I was surprised to see a kingfisher fly across the Thames from the Houses of Parliament towards St. Thomas's Hospital, and then cross the bridge and fly down the river. It seemed at a loss to know where to settle. I see by the *Standard* it has been noticed lately in the Serpentine.—*J. L. Hawkins.*

The Bottle-head Whale.—On the 31st August I wrote a letter to the editor of *Chambers's Journal* respecting the capture of a cetacean. It happened on the 22nd ult. near Nice. He advised me to forward to you the drawing and description of the same. As to external appearance, this cetacean had a great likeness to the Bottle-head, of which a description is given in Chambers's "Encyclopædia," except that the surface of the body was all over covered with narrow irregular white stripes; but when I went on the spot (three days after the capture) they had almost disappeared. A more remarkable difference between the two specimens lies in the skull, as you can judge from the adjoining drawing. Would not this induce us to establish a new species of *Hyperoödon*, contrary to the general opinion that there exists one species only? The total length of this cetacean was 5·70 métres. It was driven ashore alive, and was condemned to total destruction had I not interfered. The skeleton has been so preserved and brought to Nice. A similar, but not quite identical specimen, was caught many years ago on

our coast, and described by our naturalist Risso. There were stripes on the body, as in the present one, but the forehead was even more flat, and the dorsal fin trapezoidal instead of triangular ; so, at any rate, it was represented by a drawing. No description was given of the skeleton.—*Hippolyte de Pierlas, Nice.*

BOTANY.

Alpine Flowers.—Hermann Müller writes to *Nature* to say that in the Alps he has found some instances of different forms of flowers in plants of the same species, which, as far as he knows, have been hitherto undescribed ; of which he gives a short notice as follows :—*Geranium sylvaticum* is in one locality near the Albula Pass gynodiœcious, with large-flowered hermaphrodite, and small-flowered female stems. *Veratrum album*, *Dryas octopetala*, and *Geum reptans* are in all the localities where he has examined them androdiœcious.' *Astrantia minor* offers a quite peculiar sort of androdiœcium, some stems bearing, as in other *Umbelliferæ*, in the same umbel *hermaphrodite flowers* and male ones, other stems producing solely male flowers. *Dianthus superbus* seems at first sight to exist in three forms : (1) Stems with hermaphrodite flowers, being perfectly proterandrous and producing a moderate quantity of whitish pollen ; (2) stems with female flowers containing very conspicuous rudiments of stamens, but pollenless anthers ; (3) stems with pistils remaining imperfectly developed, and with anthers containing abundance of a brown powder. At first sight H. Müller thought their flowers to be male, and the brown powder to be pollen-grains ; but under the microscope the latter proved to consist of grains, the diameter of which is only about one-eighth of that of the pollen-grains of the hermaphrodite flowers. He supposes, therefore, these grains to be the spores of some species of fungus, and *Dianthus superbus* to be gynodiœcious.

Vegetable Teratology.—The state of *Plantago lanceolata* in which the spike is replaced, surrounded or surmounted by a tuft of leaves, appears to be very plentiful this season, as I gathered no less than thirteen such specimens, all growing in different places, when taking a walk on August 16th. In several of these the spike is surmounted by from two to five leaves, while in others a second spike springs from the centre of the leafy tuft. In one specimen the rosette of leaves surmounting the stem is pretty large, and ten spikes spring from its base, their stems varying from half an inch to four inches in length, and the whole forming a sort of irregular umbel. The dry summer, succeeded by showers at the end of July and beginning of August, has probably something to do with the unusual abundance of these curious aberrations.—*D. Douglas, Leith.*

Beeches and Hollies ; Oaks and Hawthorns.—A friend of mine tells me that about the middle of September he was in the New Forest, where he noticed that beneath the large beech-trees there was an abundant under-growth of hollies, but no hawthorns, whereas under the oaks there was an abundant growth of hawthorns, but no hollies. I should be glad to have an explanation of this.—*R. H. Alcock.*

"Flowerless Plants."—Under this title Dr. Franklin Parsons has contributed two most readable articles in the recent numbers of *The Naturalist*, which, as our readers are aware, is the journal of the Yorkshire Naturalists' Union, and their general field club record. Some time ago we heard a whisper that *The Naturalist* would have to be discontinued for lack of support. We sincerely hope our Yorkshire friends will not allow such a stigma to fall on their hearty and generous county.

Vegetable Moth-trap.—Mr. W. Simpson, of Dartmouth, has described a large plant of *Physianthus albicans*, belonging to the *Asclepiadæ*, which flowers there in the autumn very profusely. He says it is one of the most deadly moth-traps he knows. Many days running he found from two to eight Humming-bird Hawk-moths caught by their probosces in the flowers, where they died in about two minutes. Other insects were also found dead in the flowers. The plant is of trailing habits, and easily trained over porches. Have any of our correspondents noticed its insecticide habits ?

European Fungi.—All botanists will be rejoiced to hear that Dr. M. C. Cooke, A.L.S., and Mons. L. Quelet, M.D., have written conjointly a work, entitled "Clavis Synoptica Hymenomycetum Europæum," which has been just published as a handsome little volume by Messrs. Hardwicke & Bogue at 7s. 6d. In this book every species of fungus heretofore found in Europe is described in brief but excellent and easily understandable Latin ; so that it is a work which thus requests a world-wide circulation. The high reputation of its authors as fungologists must make the present work a hand-book to all botanists.

Double Flowers.—A few days ago we examined the flowers of the common *Petunia*, and found the stamens had developed into petals. Each so-formed petal was distinct, so that the internal structure was thus polypetalous. We have noticed that whenever the stamens are thus modified in gamopetalous flowers, the newly-formed petals do not cohere. Does not this indicate that polypetalous corollas must have preceded the gamopetalous in the order of floral evolution ?

"The Herefordshire Pomona."—Under this title the first part, price 15s., has just been issued by Messrs. Hardwicke & Bogue, of a most magnificent work, containing coloured figures and descriptions of the most esteemed kinds of apples and pears.

coloured plates are of the very highest degree of excellence, and it is long since we have seen illustrations of natural-history books so artistically executed. There can be no doubt that this artistic superiority will of itself give this much-needed work an extensive circulation. It is edited by Dr. Robert Hogg, F.L.S., and is chaperoned, we believe, by the well-known and energetic Woolhope Naturalists' Field Club. The letter-press contains outline woodcuts of every variety of apple aud pear in cultivation, besides other engravings of high merit.

Fig. 220. Median prolification in Common Daisy.

MONSTROSITY IN THE DAISY.—The above is an illustration of median prolification occurring in a specimen of the common Daisy (*Bellis perennis*) found at Cobham. It occurs frequently in gamosepalous and gamopetalous flowers, when it is known under the term of "hose in hose," but we have never seen it before in a composite flower.

GEOLOGY.

THE LATE MR. THOMAS BELT, F.G.S.—It is with much regret that we have to announce the death of Mr. Thomas Belt, F.G.S., one of the most distinguished of the younger school of naturalists, who died after a short illness, of rheumatic fever, at Denver, United States, in the 46th year of his age. He was a frequent and valued contributor to our columns, and only a few weeks ago sent us the account of his discovery of a human skull at Denver, under circumstances indicating high antiquity. He was the author of several works on natural history, the best known of which is the "Naturalist in Nicaragua."

WHAT ARE CONODONTS?—At a recent meeting of the Natural History Society of Glasgow, Mr. John Young, F.G.S., read some notes on a group of fossil organisms termed Conodonts, which have recently been discovered in the Carboniferous limestones of the Ayrshire coal-field by Mr. John Smith, of the Eglinton Ironworks, Kilwinning. These organisms are minute, slender, conical, tooth-like bodies of varying forms, of a brownish colour, and having a glistening or enamelled appearance; few of them exceed an eighth of an inch in length, many of them being much smaller; they are mostly of a comb-like form, being serrated along one of the sides with a row of teeth, often of unequal length and stoutness. Conodonts were first brought under the notice of geologists by Dr. Pander in 1856, in a work descriptive of the fossil fishes of the Silurian formation in Russia, in which country they are found ranging in strata from the Upper Cambrian to the Carboniferous deposits. In America they have also been discovered in the Devonian and Carboniferous formations; Professor Newberry having figured and described a number of Carboniferous forms in his work on the palæontology of Ohio. But until this discovery of Mr. Smith's, no remains of Conodonts seem to have been noticed in the strata of the several formations in Britain. Mr. Young stated that he had recently the opportunity of submitting Mr. Smith's specimens to a Canadian palæontologist, Mr. Jennings Hinde, while on a visit to this country, and he stated that they were closely related to the American forms, especially to those described by Prof. Newberry. Although Conodonts have now been known to palæontologists for more than twenty years, great doubts still exist as to what group of animals these curious teeth-like organisms belong. Dr. Pander, their first discoverer, thought they were the teeth of a group of cyclostomatous fishes allied to the present lampreys. Professor Owen doubts their fish affinities very much, and says some of them may be the dentated claws of small crustacea; others may be the teeth hooklets or denticles of naked mollusca or annelides. Professor Newberry thinks Dr. Pander is right in referring them to fishes; if so, fish-life will have to be carried forward to a much earlier period in the history of our globe (namely, the Cambrian), no undoubted fish-remains being at present recorded from strata older than the Upper Silurian. These Conodonts are found in both the upper and lower limestones of the Ayrshire coalfields; upwards of thirty forms have already been discovered, and it is probable the number may be increased by further researches in the deposits. Along with the Conodonts, Mr. Smith has also found a new group of fossil sponges, different from those of *Hyalonema*, which he discovered last year in the Lower Limestone series at Cunningham Bedland, near Dalry. The silicious spicules of this new group of sponges from the Upper Limestone are of various types, and Mr. Young stated that at present the forms were being examined by Professor Young and himself, and they intended bringing them up at a future meeting. The same deposit also contains an interesting group of small forms of mollusca, in a fine state of preservation, many of the univalve or spiral shells, having their mouths

quite entire, and several of them being of species not formerly recorded from the Carboniferous strata of the West of Scotland.

PERPENDICULAR HOLES IN ROCKS.—In a section of what is, I believe, inferior oolite, underlying sand at Manton Warren, near Kirton-in-Lindsey, Lincolnshire, there are exposed to view perpendicular holes of some ten inches in diameter, passing through the successive layers of stones, and through the stones themselves, as if bored. A depth of 5 ft. is exposed to view, but how much deeper they go I do not know. I observed three within a few feet of each other. The diameter does not appear to decrease with the depth. Will any one state the probable origin? Are they "pot-holes"? The stone obtained has been broken up for roads. The warren is elevated above the surrounding country.—*J. N. D., Tuxford.*

A NEW EOCENE MAMMAL.—A new genus of pachydermatous mammals, nearly allied in its dentition to *Palæotherium*, has been recently found in the Lower Eocene beds of Transylvania. The fearful generic name of *Brachydiastematherium* has been given to this extinct creature.

A NEW OOLITIC PTERODACTYLE.—Hitherto no Pterodactyle remains have been found in America of older date than the Cretaceous period. News comes to us, however, of a species of *Pterodactyle* which has just been found in the Oolitic rocks of Wyoming, whose outspread wings must have been five feet from tip to tip. It has been named *P. montanus.*

GEOLOGY OF THE AMERICAN LAKE REGION.—Mr. George Maw, F.G.S., writes as follows on this subject:—"We must set aside the view that the chain of large lochs is due to glacial excavation; for Ontario, the deepest of the lakes, running east and west, is in lower latitude than Huron, the bottom of which is 510 feet above that of Ontario; and there is no high ground about Ontario from which ice could have originated as a preponderating mass, capable of excavating Ontario 600 feet deep; nor is there any mass of débris anywhere to be seen about the lake as would represent such an excavation."

NOTES AND QUERIES.

WATER-BOATMAN.—Your readers, who are no doubt familiar with the very savage instinct of this insect, may be interested to learn my experience of him. He really appears to be quite shark-like in his nature. A few weeks since, whilst staying with some friends in Cambridgeshire, to amuse the children I collected from several ditches various Sticklebacks, Whirligigs, Newts, a Frog, &c., and three Water-Boatmen. These I thought might possibly make a nice little "happy family"; but my hopes were doomed, as the boatmen soon proved themselves to be most formidable. They attacked each of the animals before-mentioned except the Whirligigs, whose movements were too quick for them. After killing the insects and Sticklebacks, one fastened himself to the frog's leg.—*H. Hall.*

LABURNUM FLOWERS.—Laburnum trees are in blossom here now (September). Is not this an unusual phenomenon?—*R. H. Nisbet Browne, Folkestone.*

PALM ROOTS.—With reference to the question propounded in your issue for October, as to whether palm-trees have tap-roots or not, I find, on consulting the highest authorities in the library of the Linnæan Society, that the roots are fibrous masses. Stephen Endlicher, in his "Genera Plantarum," published in 1836–40, writes thus:—"Palmæ Plantæ liquescentes, acrobryæ habitu peculiari. Radix palaris, mox evanida; radiculæ plurimæ, cylindricæ, simplices et ramosæ, fibrillosæ, in molem conicam sæpè ex parte hypogæam densè compactæ." Loudon, in his "Encyclopædia of Plants," writes:—"The lofty stems of palms are supported by a mass of fibrous roots, which frequently cross along the surface of the ground." In the "Hortus Indicus Malabaricus," by Henry Van Rheede, published in 1628, the author states that the Palm diffuses its root-fibres widely in a transverse direction. With regard to the interpretation of the verse of Psalm xcii., where the righteous are compared to the vigour of the Palm-tree, it would be presumptuous in me, as a layman, to offer an opinion or discuss it in a theological point of view. Canon Tristram, in his "Natural History of the Bible," alludes to the 12th verse of the above Psalm: "Here the life of the righteous may be compared to the Palm-tree for many reasons. It flourishes in a barren soil; it requires constant moisture; it is a lofty tree, a straight tree; it is always growing so long as it lives, and it is always green, and always bears fruit as far as possible from earth, and as near as possible to heaven. We may add, too, the elasticity and upward growth of its fibre, even when loaded with weight." The following is extracted from Mr. Hooker's translation of Le Maôut et Decaisne:—"Palms, perennial woody plants, elegant or majestic in habit. Primary root decaying early and replaced by numerous adventitious roots, which are developed at the base of the trunk, and form a compact conical mass, often very voluminous and rising more or less above the soil, and in certain cases raising the trunk and supporting it like the shrouds of a ship." The Palm-trees with which I was most familiar in India were the Cocoa-nut and Date. Neither had tap-roots. Professor Bentley, in his "Manual of Botany," writes: "The true or primary root, from its being formed by a direct elongation of the radicle, generally continues to grow downwards for some time at least, and hence forms a main trunk or axis from which the branches are given off. Such a root is termed a tap-root, and may be commonly observed in dicotyledonous plants. On the contrary, the roots of monocotyledonous and acotyledonous plants, which are adventitious, are usually of nearly equal size, and given off in variable numbers from the radicle." The above remarks will, I think, show that the palms do not possess tap-roots.—*John Colebrook.*

ROOTS OF PALM-TREE.—There are several kinds of trees called Palm, and the first question to be settled should be, Which is the Palm-tree of the Bible? Many are of opinion that it is the *Phœnix dactylifera*, or Date-palm, which affords food to both man and animals; and I will, therefore, give you a short description of the Palm met with by Bonar in the desert of Sinai. He says: "The roots

are unlike any other tree-roots we had seen, and peculiarly fitted to absorb every drop of moisture that the sand contains. In general form and structure they put us in mind of the Dahlia and Ranunculus, consisting of long fleshy strings or ropes, shooting straight down into the soil in numbers quite beyond our reckoning, and extending over a large circle, whose width we could not ascertain." Again, the same writer observes: "What an apparatus for drawing up the moisture of the desert." The roots of all the *Palmaceæ* are described as fibrous; no matter what the form may be, or the size of the stem, it is invariably woody, and the roots fibrous. This is the sum and substance of all I have been able to call to mind as having read of the Palm-tree; but many who are better versed in the matter will reply to "A. B.'s" question.—*Helen E. Watney.*

CAT AND RABBITS.—A curious case of the adoption by a cat of some rabbits has come under my notice. The mother of the rabbits died, and the kittens having been destroyed, the cat suckled the rabbits and brought them up. This occurred in a small village in Surrey. May not this throw some light on the story of Romulus and Remus being suckled by a wolf, supposed by historical research to be fabulous?—*H. P. Barclay.*

EGG DRILLS.—Beta will be able to obtain the instruments described in my article on collecting birds' eggs, of Mr. J. Everard, surgical instrument maker, 34, Berners-street, W.—*T. Southwell.*

MARSH TIT.—In answer to "C. C.'s" question (SCIENCE-GOSSIP, page 234) "as to whether the curious note, resembling the whetting of a saw, belongs to the Marsh Tit," it is certainly not the Marsh Tit, *Parus palustris*, because that peculiar note is heard in situations where the Marsh Tit is not found. We believe the note to belong to the Great Tit, *Parus major*. The song is heard as early as January, often from the top of a high tree. The bird is very remarkable from the similarity of the simple note to the sound made in filing a saw. Hence, in Staffordshire, the bird is commonly called "Saw-whetter."—*Elizabeth Edwards.*

MIGRATING BIRDS.—Last Sunday I heard, about eight o'clock p.m. the whistling of innumerable birds, passing over Northallerton in a south-westerly direction. I presume them to have been a flock of plovers. They continued to pass over until eleven o'clock. Are these birds regular migrators, or does the present case betoken the approach of a severe winter?—*J. A. Wheldon.*

SEA ANEMONES.—"C. E. R." will be glad to learn that I kept two of *Bunodes gemmacea* for the greater part of a year, and might have done so for a longer period, as they were still in first-rate condition when the accident occurred which caused their death. I kept them in a glass bottle of about six inches diameter, with a loosely-fitting stopper always on, and they were fed twice a week with bits of shrimp, such as one buys at the fishmonger's. I find that small and delicate sorts do well in these bottles; the glass stopper prevents evaporation. Small plants appear quickly all over the sides, and altogether they are the most self-compensating aquaria which I know. I have kept them for long periods without diminution of the contents, and consequently without having the water more dense than at first. Will "C. E. R." be good enough to describe his treatment of *Tealia crassicornis?* I have read, and have been told on good authority, that it is impossible to keep it. My attempts have always failed; but, owing to circumstances, I have been unable to obtain one of which I could say with certainty that the base had not been injured.—*W. G. H. C., Frome.*

ZOOLOGICAL NOTES.—There was shot on the Tees on the 30th September a female Great Northern Diver (*Colymbus articus*), also a Stormy Petrel (*Procellaria pelagica*). Two swans were also shot, and are now in the hands of Mr. Richardson, of this town, for preservation. During the last fortnight large flocks of Wild Duck, Teal, Widgeon, &c., have been passing on their autumnal migration; several large flocks of geese have been seen passing over the Cleveland Hills. A Death's-head Moth was also captured at the end of September.—*George Simpson, Middlesbro'*, October 6th.

THE SONG THRUSH AND BLACKBIRD PAIRING.—In confirmation of Mr. Robert Holland's article in SCIENCE-GOSSIP of June, on "Remarkable Nests," it might be well to insert the following well-authenticated instance. In the island of Howth my daughter saw a cock blackbird sitting on a nest where previously a hen thrush had been sitting. There were young ones in the nest, which was *not lined.* There can be no doubt as to identity, as it was remarked by others.—*S. A. Brenan, Clk., Allan Rock, Co. Tyrone.*

SONGS OF BIRDS, &c.—A work on the songs of birds and other animals as related to human music, and as furnishing a basis for a theory of melody, has occupied me two years. The chief impediment is the lack of received observations. I should be most grateful if you kindly assist me in any of these ways, viz.:—1. Reference to books, &c., containing songs of birds or other animals in musical notation. (Copies of these would be still more valuable.) 2. Results of your observations on bird or other songs. 3. Is there noticed with any frequency in these songs the occurrence of any fundamental intervals of human music,—as the octave, fifth, fourth, and third? 4. (A question only seemingly irrelevant)—If singing in the ears has ever happened to you, have any of the fundamental intervals above mentioned been observed between the minute tones? 5. Any information that may occur to you as bearing on these subjects. All contributions will be acknowledged, and the results sent to you on publication.—916, *Washington Street, San Francisco, Cal.*

PARASITES ON BIRDS.—Are there any means of destroying the parasites on fantail pigeons? The fantails are kept in a large open room at the top of the house, with the window constantly open, so that they fly in and out at pleasure. The parasite which most infests them is about the eighth of an inch long, dark in colour, very slender in proportion to its length, so that to an ordinary observer it hardly appears to be an insect; there is also another, round in shape, perhaps one-sixteenth of an inch in diameter, and pinky in colour. The birds have fresh water every day for bathing. Is there any danger of the creatures forsaking the bird for the human habitants of the house, as the pigeons are very tame, and perch on head or shoulder? And will the Editor kindly tell Mrs. Geveke if there is any sensible reason why pigeon feathers should not be used for stuffing pillows, &c.—*M. G.*

PALMS AT SHANGHAI (page 178).—Your correspondent, Mr. Nelson, calls attention to the fact of Palms enduring frost and snow at Shanghai with impunity. Judging from the short and negative description which he gives, viz., that they are *not* "as

graceful as the lofty Cocoa-nut trees of Ceylon, or the Sago-palm of Borneo," I am inclined to think that the species to which he alludes is Fortune's Chamærops, which is an inhabitant of the cooler portions of China, and one or two specimens of which might be seen, a few years ago, growing in the open air at Kew. But the general question of acclimatization is one well deserving the attention of botanists and florists. If all plants that are uninjured by frost or snow in their own country could be guaranteed to be equally hardy in England, the matter of acclimatization would be very simple. Our shrubberies, and heaths, and hedgerows would be enlivened with many a bright gem from Canada, Switzerland, and the mountainous portions of hotter lands. I have lately returned from a sojourn in Tasmania, and there, every winter, the lovely Fern-trees, which abound in the mountain gullies, are weighed down with snow; and quaint Gums (*Eucalypti*) and feathery Wattles (*Acacia*) flourish in a temperature rivalling in coolness that found in many parts of England. But nothing is more certain than that neither Fern-tree, Gum, nor Wattle will exist in Great Britain, except in one or two favoured situations. The reason of this apparent paradox is not far to seek. The incapability of these foreigners to bear the severity of an English winter is simply due to the difference between their respective summers. In the countries named, during the summer months, there is an almost continuous outpouring of the sun's actinic rays, thoroughly ripening the wood, and giving life and vigour to the contained fluids, while, at the same time, the atmosphere is comparatively dry, and the air is not eternally loaded with superabundant moisture. We all know how different from this is the normal condition of the English summer. We certainly get the advantage in the greenness of our meadows and the fresh appearance of our vegetation, aspects for the most part unknown in the countries alluded to; but the incessant humidity, and the general absence of sunlight, are fatal to the well-being of plants which in other lands, thanks to the summer solar ray, can defy the frost and snow of winter. A very careful selection might add a few foreign names to our native species; but before Palms and Fern-trees grace our landscapes, the theory of "heredity" must be worked out patiently and slowly, and then possibly the "survival of the fittest" may take place.—*W. W. Spicer.*

CLAMS.—I have tasted clam soup in America. It is somewhat like oyster soup, but I believe it is made, not from the giant-clam, *Clama gigas*, but from the soft clam of the northern shores, the *Mya arenaria*, which is very much used in America as an article of food. It is found in great abundance on the coast of New England, and makes good bait in cod and haddock fishing. The shells are dug up from thin beds at low water. They are found a foot or so deep below the surface, their siphon-tube projecting upward in the hole by which they communicate with the water at high tide. They are "shucked," that is taken out of their shells, and salted for the fisheries. As many as five thousand barrels a season are thus consigned. Clams are often mentioned in the early history of the Plymouth colony; and judging from scalloped clams, roasted clams, and clam soup, I have no doubt but what Mr. W. A. Cairns will find preserved clams very fair eating for persons who rejoice in a good digestion.—*H. E. Watney.*

A MYSTERIOUS GIFT.—An account of the first ascent of the Peter Botte Mountain is given in the *Penny Magazine* for 1833, which is probably the one referred to by your correspondent, Alfred Paterson. —*Charles Madeley.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

M. (Bradford).—You will find instructions as to preparing such skeletons as you require in the chapter on "Bones," in "Collecting and Preserving Natural History Objects," published by Hardwicke & Bogue, price 3s. 6d.

C. A. COWLEY.—Your specimen is the beautiful and rare *Astrantia major*, found in Shropshire. See articles on it at page 8 of SCIENCE-GOSSIP, vol. for 1873.

M. J. WILDE.—No rock specimens, such as described in your letter, have yet reached us.

O. P., Cambridge.—The Agaric is evidently a very young state of *Agaricus* (*Mycena*) *polygrammus*. Fr. *M. C. C.*

DAVID SCOTT.—Your plants are: 1. *Anthemis nobilis;* 2. *Cardamine amara;* 3. *Parnassia palustris;* and 4. *Saxifraga stellaris.*

YOUNG MUSCOLOGIST.—Get Hobkirk's "Synopsis of British Mosses," price 10s. 6d., published by Lovell Reeve.

A. BERNARD.—The curious monstrosity of the stems of the *Malva moschata* (which we are much obliged to you for sending us) is described by Dr. Masters in his "Vegetable Teratology" by the name of *fasciculation.* It is caused by the abnormal growing together of branches, just as the normal substance we call "horn" is due to the agglutination of hairs.

J. SIMS.—Of course we are obliged to trust to the honour of those who use our exchange column, and we cannot be expected to guarantee good faith. We shall always feel obliged if "exchangers" will notify to us any breach of faith. We shall then take good care to exclude the offenders for the future.

A YOUNG GEOLOGIST.—Your fossils are:—1. *Pectunculus glycimeris* (young specimen); 2. Fragment of *Natica;* 3. *Purpura lapillus.* The crystals are selenite, or sulphate of lime, derived from the London clay. See chapter in Taylor's "Geological Stories," entitled "Story of the Crags."

J. K. (Yarmouth).—Trimmer's "Flora of Norfolk" is a well-known and highly esteemed work. (2) We have not heard of any recent numbers of Donkin's "British Diatomaceæ" being issued; nor can we guess the cause of the delay, unless it be the author's professional engagements. Your plants are named correctly in the parcel sent us.

J. KIRBY.—You may get the materials mentioned in Dr. Woodward's process for staining muscular tissues from any first-rate chemist.

W. J. R.—Write to Mr. Van Voorst, publisher, who has (we believe) published lists for labelling, such as you require.

J. ANDERSON, jun.—The Fuchsia with the calyx segment transformed into a green veined leaf is very curious, and very instructive as an illustration of reversion.

J. W. N.—The slide contains elytra, &c. of the *female* of the common water-beetle (*Dyticus marginalis*). The female is so unlike the male in appearance that it was formerly regarded as a different species.

A. WHELDON.—Thanks for your monstrosity of *Plantago lanceolatum*, showing three heads on one stalk.

K. D.—Will you kindly send us your query again, as we have mislaid it.

G. R. REDGRAVE.—The malformed rose with mass of petals arranged around the stem beneath the main mass is a case of what Dr. Masters terms "mediate prolification." See his masterly work on "Vegetable Teratology."

GREGORIUS and A. G. WRIGHT.—See article on "Preserving Fungi," by Mr. Worthington Smith, the eminent fungologist, in "Collecting and Preserving Natural History Objects."

T. WATSON (Burnley).—Your best plan would be to offer the instrument for exchange in our "exchange" column. Or advertise it for sale in the magazines you name. There are none better.

A SUBSCRIBER.—Your grapes are attacked by the usual vine disease, which is a fungus. For its treatment consult any work on grape-culture.

H. W. S.—We like the paper, and shall insert it at our earliest opportunity.

F. W. HYTCH.—There is a "Postal Microscopical Club" established, of whose rules, &c. you will find a full account in SCIENCE-GOSSIP, vol. for 1873.

W. GAIN.—From the description of your larva we conclude it is that of the goat-moth (*Cossus ligniperda*), but we cannot judge definitely without seeing it. Leave it where it is.

F. ALEXANDER.—Your larvæ of *Jacobæa* will hybernate. Benzine may be used in stuffing moths; and a little fine chalk or fullers' earth mixed with the wool, to absorb the natural grease. You will find a good description of *Filipendula* in Hooker's "Student's Flora of the British Islands."

LYMNEA INVOLUTA.—We should feel obliged if some of our correspondents in the Killarney or other districts would supply us with a few *living* specimens of this mollusk. The sooner the better.

J. SINEL.—The parasitic insect of which you sent us a sketch is named *Gamasus coleoptratorum.*

A. C.—Your moth was a specimen of *N. rhomboidea*, whose wings had been aborted. It reached us alive, but the wings never fully developed.

L. S.—The objects on surface of the leaf are not due to any parasitical disease, but are caused by an insect, a species of *Cynips*, which punctures the skin.

"CONSTANT SUBSCRIBERS."—We wish our correspondents would adopt some other *nom de plume.* We have several this month, and are in a complete quandary as to which is which. To one who writes under this name we beg to say that no plant was enclosed.

EXCHANGES.

MICROSCOPICAL cabinet for exchange, capable of holding 1,920 slides lying flat; mahogany and deal, value £4; for further particulars write to Wm. J. Fuller, Corve Lodge, Greenway-road, Redland, Bristol.

WANTED, vol. ii. of "Coloured Illustrations of British Birds and their Eggs," by H. L. Meyer (1842).—Jos. Sinel, Bagot, Jersey.

FOR unmounted pieces of skin showing scales from the back and belly of Lizard, send object of interest to G. Moore, 12, Porchester-street, near Clifford-street, Birmingham.

OFFERED, Turton's "British Shells, Land and Freshwater," in exchange for any other Book of equal value, Fossils, or any Natural History Objects.—Address, T. C. Maggs, Yeovil.

OFFERED, 84 numbers "Nature," 2 vols. "Popular Science Review," Hogg "On the Microscope," Latourneau's "Biology," and Withering's "Botany." Wanted, vols. 3, 4, and 5 of Jeffrey's "British Conchology," or back numbers of "Zoologist and Naturalist" prior to 1878.—J. D. Butterell, 26, Coltman-street, Hull.

FOR cleaned Foraminifera from Ireland send good Slide or Material, not polariscope, to A. Alletsee, 11, Foley-street, London, W.

SEVERAL pairs of Cowries (*C. caput serpentis*) for exchange for Shells, &c. — Mrs. Skilton, London-road, Brentford, Middlesex.

FOR Cuticle of Indian Corn (*Zea Mais*) send a stamped directed envelope to W. H. Gomm, Sandwich, Kent.

RARE British Plants dried, for Lepidoptera, Birds' Eggs, or Shells.—L. R. H., 4, Ellesmere-villas, Devonshire-road, Forest-hill.

OFFERED, Nos. 246, 1280, 1381, 1403, 1479, 1505, and many others, for Nos. 187, 325, 500, 518, 615, 626, 676, 728, 762, 823, 985, 997, 1299, 1300, 1471, 1622.—E. D. C., 25, Oxford-road, Kilburn, London.

FOR leaf of *Deutzia scabra* unmounted, send stamped envelope or other microscopic object to M., 3, Belmont Villas, New Brompton, Kent.

FOR injected Human Kidney, injected Human Intestine, stained Human Intestine, and Japanese Grass, all in balsam, send pure gatherings of diatoms or any well-mounted balsam slides to J. A. Kay, Mansion-house, Brompton, Chatham.

I HAVE Cassell's History of the Franco-Prussian War (complete, weekly numbers, unbound). Required micro slides.—W. H. Skan, 15, Brownlow-street, London, W.C.

I HAVE five numbers (one more completes the work) of Twining's "Science Made Easy," illustrated, Hardwicke & Co., quite new and cost 5s. Should be glad to exchange them for British Lepidoptera, side-blown eggs, or tolerably recent numbers of "The Entomologist," "SCIENCE-GOSSIP," or "Zoologist," bound or unbound.—W. Barrett Roué, 165, White-Ladies-road, Bristol.

A FEW Adders, preserved in spirits of wine, in exchange for rare Plants, Mosses, Lepidoptera, Shells, Fossils, or offers.—R. Renton, Fans, Earlston, N.B.

L. C., 7th edition, Nos. 84, 104, 135, 146, 176, 184, 237, 253, 363, 527, 611, 682, 683, 704, 767, 769, 831, 838, 856, 858, 864, 882, 913, 929, 971, 979, 988, 1000, 1001, 1130, 1334, 1485, 1519, 1539, and many others, in exchange for other rare British Plants. Send full list of duplicates to J. Tempere, 12, Cecil-street, Moss-side, Rusholme, Manchester.

BEAUTIFULLY mounted Slides (crystals) for the polariscope in exchange for objects of interest, mounted or unmounted.—A. Smith, Essex-road, Islington.

LONDON CATALOGUE, 7th ed. offered, 2, 39, 47, 79, 267, 277, 394, 591, 831, 858, 974, 1014, 1036, 1284, 1310, 1504, and 1650, in exchange for other rare British plants.—W. Jones, 32, Manchester-street, Oldham.

Sphærotheca castagnei on Hop offered for foreign Marine Algæ.—E. C. J., Monson Nursery, Red Hill, Surrey.

FIRST-CLASS Slides given for good material, Foraminiferous, &c., in quantity, either prepared or in the rough.—James Green, March.

L. C., 7th edition, Nos. 38, 273*b*, 534, 809, and others, including many from the Lake District, for 183, 553, 588, 590, and others. Lists exchanged.—A. W. Preston, 49, Cheltenham-street, Barrow-in-Furness.

RARE British Vertigos. Correct and well-authenticated (duplicate) specimens of *Vertigos antivertigo, pusilla, minutissima, alpestris, substriata,* and *angustior*, offered in exchange for really good and choice Foreign Shells—land preferred to marine. Also offered, *Limnæa involuta, Succinea oblonga.* Wanted, *Limnæa Burnetti, Acme lineata.*—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

FOR exchange, an Herbarium of British Phanerogamous Plants, containing over 600 species, many rare, in good condition. Offers requested, list will be forwarded.—A. Macindoe, Maryhill, Glasgow.

OFFERED, *Helix revelata, Clausilia biplicata, Planorbis lineatus*, &c. &c., and many British marine. Wanted, British Vertigos and Northern marine species.—A. H. Cooke, King's College, Cambridge.

FOR piece of Chinese Rice-paper (pith of tree) mounted send well-mounted object to Thos. Shipton, Chesterfield. Lists exchanged.

BIRDS' EGGS, side-blown, well-marked, labelled, picked specimens; also beautiful specimens of British Butterflies and Moths, well set; also British Coleoptera, splendidly set, new style. Lists free. Exchange side-blown eggs new to collection. Foreign correspondence solicited.—Henry Sissons, Westbourne-road, Sheffield.

SEVERAL packets of Diatomaceous Earth for exchange for mounted sections of Coniferous wood (three packets) for good slide. Wanted also the Club Mosses and Selaginelli. Fossil Polyzoa in exchange.—G. R. Vine, Attercliffe, Sheffield.

FOR piece of Sea-mat (*Flustra truncata*) send stamped directed envelope. Also for portion of lung of White Whale (*Beluga leucos*) or two or three embryo cuttlefish (*Sepia officinalis*) send well-mounted object to E. M., 20, Crossley-street, New North-road, London.

SEVERAL immense living Chrysalides of *Acherontia Atropos* offered in exchange for good Natural History Slides or microscopical accessories.—W. Lane Sear, Margate, Kent.

SIDE-BLOWN Birds' Eggs and Skins. Will exchange about 200 varieties, guaranteed true typical specimens, richly marked; dates and localities supplied. Lists exchanged.—John William Sissens, 11, Priory-road, Sheffield.

WANTED to exchange, Mounted Objects, principally photographs, for good mounted objects.—E. Atkins, Chemist, 200, Essex-road.

To exchange, a quantity of Diatomaceous Earth for mounted objects or anything of interest. Stamp for reply.—A. Smith, 198, Essex-road.

WANTED, varieties of *Succinea* (especially *S. putris*, var. *vitrea*) and other species. Good exchange given.—Mr. Marshall, 1, Portland-cottages, Portland-place North, Clapham, London.

BOOKS, &c., RECEIVED.

"English Folk-Lore." By the Rev. T. F. Thistleton Dyer, M.A. London: Hardwicke & Bogue.

"Pleasant Days in Pleasant Places." By Edward Walford, M.A. London: Hardwicke & Bogue.

"Annual Report of the U.S. Entomological Commission on the Rocky Mountain Locust, 1877." Washington: Government Printing Office.

"Section Cutting." By D. Sylvester Marsh. London: J. & A. Churchill.

"Popular Science Review." October.
"Land and Water." ,,
"Journal of Applied Science." ,,
"Chambers's Journal." ,,
"Feuille des Jeunes Naturalistes." ,,
"Midland Naturalist." ,,
"The Scottish Naturalist." ,,
Various Pamphlets.
&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 9TH ULT., FROM:—F. K.—T. S.—M. S.—J. C.—J. H.—C. A. C.—H. C. C.—A. A.—W. J. F.—J. M.—F. E. M.—W. H. G.—J. D. B.—F. I. B.—J. L. H.—E. E.—J. A.—J. M. H.—J. W. J.—G. T. B.—H. E. W.—H. L. B.—E. F. C.—T. W. D.—D. S.—Prof. B.—S. T.—C. A. G.—W. J.—E. C. J.—A. B.—J. N. D.—W. G. H. C.—R. H. A.—Dr. P. Q. K.—J. E. L.—A. S.—W. E. F.—J. T.—A. G. W.—G. S.—J. P. G.—G. A. G.—W. H. S.—J. S.—W. B. R.—J. K.—R. R.—J. A. K.—Dr. M.—U. W. M.—J. A. W.—R. D.—H. J. R.—W. C.—W. S.—A. W. P.—A. M.—A. H. C.—J. G.—T. S.—E. M.—K. D.—H. S.—W. L. S.—H. I. T.—E. S.—R. M.—I. T.—W. E. G.—G. R. V.—W. S.—J. K.—H. W. S.—F. W. H.—J. T. M.—A. S.—E. A.—&c. &c.

QUARTZ, AS IT OCCURS IN THE LAKE DISTRICT: ITS STRUCTURE AND ITS HISTORY.

PART III.

By J. CLIFTON WARD, F.G.S., F.R.M.S., &c.

A FEW years ago, being anxious to apply Mr. Sorby's method to the granites and granitoid rocks of the lake-country, I examined a number of slices of the granite rocks, and measured nearly five hundred cases of liquid-cavities, ascertaining the relative size of the vacuity (or bubble) to the liquid-cavity. My method of proceeding I will describe directly, but I will at once state that the result arrived at in the case of the Skiddaw granite, for example, was, that its consolidation took place under a pressure of rather more than an equivalent of 51,000 ft. of rock, and that the *mean* pressure under which all the principal granitic and granitoid rocks were consolidated was equivalent to that of 44,000 ft. of rock.

My experiences in the course of this investigation may be of interest to some who wish to undertake original work of a similar kind. (For the Memoir containing the investigation as a whole see *Quarterly Journal of the Geological Society*, vol. xxxi., p. 568.)

The object-glass generally used was a $\frac{1}{4}$-in. (of Collins), with a C eye-piece, the combination magnifying 665 times. When I first began my measurements I used a neutral-tint glass reflector, and traced on paper all the best-defined fluid-cavities, making a note by the side of those in which the vacuities showed a constant spontaneous movement. I soon found, however, that on a comparison of a considerable number of drawings, the fixed bubbles were almost invariably relatively larger than those which showed this free movement. Hence I was led altogether to reject from my measurements all cases in which the bubble was fixed, and in which it would seem either that gas had been primarily entrapped, or that in the making of the thin slice leakage had occurred in the cavity. This last case must necessarily often occur in the making of thin slices, especially as the liquid-bearing cavities are frequently so irregular in shape and prolonged into horns and fine points. I then gave up tracing the outlines of cavities on paper, and measured the relative size of bubble and liquid-cavity directly by means of a Jackson's micrometer, with divisions equal to $\frac{1}{10000}$th of an inch. This micrometer being placed in the eye-piece, the fine divisions could be brought over the bubble and liquid-cavity, and their relative size at once estimated with tolerable accuracy. But a little consideration will make it evident that measurement of a liquid-cavity in one plane would be of little use unless the cavity be exceedingly shallow and lie along that plane. Hence it became necessary to take this further precaution, viz., to rely only upon the measurements of those cases in which the tiny bubble (or vacuity) moved freely into all parts of the liquid-cavity without going out of focus; this would imply that the cavity was of tolerably uniform depth, but little more than the depth of the diameter of the bubble. And it was found that, when I restricted my measurements to these cases, there was a fairly-marked uniformity in the ratio between vacuities and liquid-cavities occurring in the quartz of the same rock.

Thus, take as an example two different rock-slices of the same granite :—

$$\text{No. 1.}\left\{\begin{array}{l}\cdot154\\ \cdot154\\ \cdot154\\ \cdot166\\ \cdot180\\ \cdot180\\ \cdot154\\ \cdot154\end{array}\right\}\cdot162. \qquad \text{No. 2.}\left\{\begin{array}{l}\cdot166\\ \cdot125\\ \cdot166\\ \cdot180\\ \cdot200\\ \cdot166\\ \cdot166\\ \cdot166\\ \cdot154\\ \cdot166\\ \cdot142\\ \cdot142\end{array}\right\}\cdot164.$$

In No. 1 there are five cases in which the whole liquid-cavity is $6\frac{1}{2}$ times the size of the vacuity, one case in which it is six times the size, and two cases in which it is only $5\frac{1}{2}$ times. The mean ·162 is probably not far from the truth.

It may be difficult to realize the size of these liquid-cavities and their contained bubbles. Those reliable for measurement are extremely small, sometimes less than $\frac{1}{10000}$th of an inch in diameter. Much larger cavities generally occur in plenty; but these seldom exceed the $\frac{1}{2000}$th of an inch in length, and in them the bubbles either have no movement, or but a very slight or sluggish one. In fact, such is the minuteness of these cavities and their number, in many cases, that more than a thousand million might be contained easily within a cubic inch of quartz, and sometimes the contained water must make up at least 5 per cent. of the volume of the containing quartz. In some cases the liquid-cavities are much arranged along lines, as in the quartz crystals occurring in the Armboth Dyke. Occasionally, however, liquid-cavities are met with in quartz crystals of very considerable size, such that the movement of the bubble can even be recognized by the naked eye. Having accumulated a sufficient number of reliable measurements, and struck the mean for any one rock, such as the Skiddaw granite, the calculation of the pressure under which the granite was formed is proceeded upon by mathematical formulæ furnished by Mr. Sorby's investigations, the temperature of a dull red heat visible in the dark (680° F.) being assumed as the probable temperature of consolidation. The result, in the case of the Skiddaw granite, is that a pressure equivalent to 52,000 ft. of rock must have been necessary to compress the liquid so that it would fill the cavities at a temperature of dull red heat.

The next question bearing upon this result is one for the field-geologist alone to determine. What is the greatest thickness of rock which can have been removed from over the mass of the Skiddaw granite as we now see it exposed? Geological investigation of the whole district leads me to infer that at one time the granite must have been covered by some 30,000 feet of rock—including Skiddaw slates, volcanic series, and Upper Silurians. But we have seen that the calculated pressure is equivalent to 52,000 ft., hence the pressure to which the consolidating granite (and therefore quartz) was subject was greater than what could be due to the mere weight of overlying rocks. How, then, was this pressure applied? We have seen that the condensed liquid confined within the quartz has remained as a registering thermometer, to show the existence and amount of the pressure, and geological examination of the district further informs us that the overlying 30,000 ft. of rock was in some way elevated and contorted,—being also slowly removed by denudation. Thus we have physical evidence, from two different sources, of the existence of great pressure exerted upon the granite-forming mass; evidence derived from the liquid-cavities and their contained bubbles, and evidence in the rocks overlying the granite of such pressure having produced elevation, contortion, cleavage, and general metamorphism. It is further interesting to notice what would be the probable heat at a depth of 30,000 ft. according to our estimates of known increase on descending through the crust of our globe. If we take that increase as 1° F. for every 49 ft. (Mr. R. W. Fox, *Brit. Assoc. Report*, 1857, p. 91), we find that at a depth of 30,900 ft. the temperature would be 360° C. (680° F.), or that of a dull red heat visible in the dark, and just the temperature at which we were supposing the granite was formed. Thus, to sum up our results in the case of the Skiddaw granite :—

1st. It is probable from geological evidence that this granite was consolidated at a depth of about 30,000 ft.

2nd. An increase of 1° for every 49 ft. on descending gives a temperature of 360° C. (680° F.) at a depth of 30,900 ft.

3rd. Microscopic evidence, deduced from examination of the liquid-cavities in the quartz, gives a calculated pressure under which the quartz was consolidated at a temperature of 360° C. (680° F.), equivalent to 52,000 ft. of rock.

4th. As the calculated pressure thus far exceeds (by 22,000 ft.) that due to the estimated thickness of overlying beds, or, what is the same thing, to the estimated depth at which the granite formation took place, it follows that there must have been a great amount of available pressure to be exerted upon the rocky crust around, and hence we find evidences of folding and contortion of the rocks, and of their upheaval and general metamorphism around the granitic area.

The case of the Skiddaw granite will suffice as an example of this mode of treatment. I have elsewhere (*Quart. Journ. Geol. Soc.*, vol. xxxi., p. 568) treated all the other granitoid rocks of the Lake District in the same way, and with very similar general results. There are yet, however, one or two points I should like to call attention to.

The first of these is the general absence among the liquid-cavities in the quartz of Lake District rocks of crystals of various salts, such as have been found in plenty in some other districts. Are we to infer from this that the liquid enclosed at the period of the formation of the granites was less saline than in some other cases? Or is it possible that a more extended investigation would make it appear otherwise? Another thing worth noting is the general absence, as far as I have been able to judge, of cavities in the quartz containing, not water, but liquid carbonic acid, which in some other rocks and other districts are not infrequent.

While thus calling attention to various points connected with the formation of quartz-bearing rocks of

the district, I am far from claiming to have examined into the question exhaustively, and would gladly see other workers take up the subject more completely, and either prove or disprove the results already obtained.

It is evident that microscopic examination throws light not only upon the origin of such quartz-bearing rocks as granite, but also upon that of quartz as an accidental and accessory mineral among rocks, and upon the mode of formation of quartz veins. We are, in fact, led to see that heated water containing silica in solution has played a most important part in geological history, that such water has sometimes been diffused through a rocky *magma* at a dull red heat, under enormous pressure, and finally become entrapped in millions of minute cavities in the solidified rock; sometimes it has worked its way up along cracks and fissures, and deposited quartz in those fissures, forming veins; sometimes circulating throughout the mass of a rock, it has deposited the quartz in all irregular cavities or vesicles, at a less degree of temperature; and finally we recognise the same heated water fully charged with silica rising to the surface in the form of the geysers of Iceland, and playing a large part in all volcanic outbursts. Surely there can be few thoughts more surprising than this, that every piece of granite we pick up contains in its quartz particles thousands of minute liquid-cavities, and, moreover, that every such liquid-cavity includes a tiny vacuous bubble in constant tremor or active motion, such motion, it would seem, having been kept up for the countless ages since the granite was first solidified deep down in the bowels of the earth. Truly, we learn great things from study of the most minute.

NATURAL HISTORY IN THE SEVENTEENTH CENTURY.

By F. Kitton, Hon. F.R.M.S., &c.

Part III.

THE first part of the treatise is devoted to hunting-dogs—*Canes Venatici*. "But because we English men make a difference between hunting and fowling, for they are called by these seuerall words *Venati* and *Aucupium*, so they term the dog who they vse in these sundry games by divers names, as those which serue for the beast are called *Venatici*, the other which are vsed for the fowl are called *Aucupatorij*. The first called *Venatici* I deuide into fiue sorts, the first in perfect smelling, the second in quicke spying, the third in swiftnes and quicknes, the fourth in smelling and nimblenes, the fift in subtility and deceitfulnes, herein these fiue sorts excelleth."

The description of each kind of dog is preceded by the derivation of its name, of which we give some examples.

"Of *the Dogge called a Terrar*, in Latine *Terrarius*.

"Those whom we call Terrars, because they (after the maner and custom of Ferrets in searching for Connies) creep into the ground, and by that meanes make afraid, nippe, and bite the Foxe and the Badger in such sort that they either teare them in peeces with their teeth, being in the bosom of the earth . . . . or at least through conceived feare drive them out of their hollowe harbours, in so much that they are compelled to prepare speedy flight, and being desirous of the next (albeit not the safest refuge), are at leisvre taken and intrapped with snares and nets laide ouer holes to the same purpose.

"*Of gentle Dogges seruing the hauke and first* of the Spaniell called in Latine *Hispaniolus*.

"The common sort of people call them by one general word, namely Spaniels, as though these kind of dogs came originally and first out of Spaine.

"There is also at this day among vs a new kinde of Dog brought out of France (for we Englishmen are marueilous greedy gaping gluttons after nouelties and couetous cormarants of thinges that be seldome, rare, strange, and hard to get.) And they be speckled al ouer with white and black, which mingled coulores incline to a marble bleu, which beautifieth their skins and affordeth a seemely show of comlinesse. These are French dogs, as is aboue declared already."

The treatise concludes with remarks on the diseases of dogs and their remedies, of which one specimen will suffice.

"If a dog grow lean, and not through want of meat, it is good to fill him, twice or thrice with Butter; and if that does not recouer him, then it is a signe that the worme vnder his tongue annoieth him (which must be presently pulled out by some Naule or Needle), & if that satisfie not, he cannot liue, but will in a short time perish. . . . Dogs are also many times bewitched by the onely sight of inchanters, euen as infants, Lambes, and other creatures, according to Virgils verse—

Nescio quis teneros oculus mihi fascinat agnos.

For the bewitching spirit entereth by the eie into the hart of the party bewitched: for remedy whereof they hang about the neck a chain of corall, as for holy hearbs I hold them vnprofitable."

Scepticism is said to be the great fault of scientific men of the present day. This sin cannot be laid to the charge of the writers on natural history in former times, and least of all to the Rev. E. Topsell; in proof of which we gave a copy of "the true picture of the Lamia."

"This word Lamia hath many significations, being taken some-times for a beast of Lybia, sometimes for a fish, and sometimes for a Spectre or apparition of women called Phairies. And from hence some haue ignorantly affirmed that either there were no such beastes at all, or else that it was a compounded monster of a beast and a fish."

Our author quotes a whole host of Greek and Latin writers who had heard of some such monster;

but as their descriptions are very vague, he thinks they have mixed up a good deal of fable with them. To leave, therefore, these fables, and come to the true description of the Lamia, we have in hand :—

"In the foure and thirty chapter of Esay [Isaiah] we do find this beast called Lilith in the Hæbrew, and translated by the auncients Lamia, which is there threatned to possesse Babell. Likewise in the fourth chapter of the Lamentations, where it is said in our English translation that the Dragons lay forth their brests. In Hæbrew they are called *Eihannm*, which by the confession of the best interpreters cannot signify Dragons, but sea calues being a general word for strange wild beasts. How be it, the matter being wel examined, it shall appeare that it must needes be this Lamia, because of her great breastes, which are not competible either to the Dragon or Sea calues, so then we will take it for graunted by the testimony of holy Scripture that there is such a beast as this. *Crisostimus Dion* also writeth that there are such beasts in some part of Libia, having a womans face and very beautifull, also very large and comely shapes on their breasts, such as cannot be counterfeited by the art of any painter, hauing a very excellent colour in their fore parts, without wings, and no other voice but hissing like dragons. . . . The hinder parts of this beaste are like unto a Goate, his fore legs like a Beares, his vpper parte to a woman, the body scaled all ouer like a Dragon,* as some have affirmed by the obseruation of their bodies, when *Probus* the Emperor brought them forth in publike spectacle."

Gesenius in his Commentary on Isaiah, says: "Lilith is, in the popular belief of the Hebrews, a female spectre in the shape of a finely dressed woman, which in particular lies in wait for and kills children, like the Lamiæ and Striges of the Romans."

In his "Anatomy of Melancholy" Burton remarks that "The Talmudists say that Adam had a wife called Lilis before he married Eve, and of her he begat nothing but demons."

One of the most remarkable animals figured in this veracious history is the Mantichora. "A beast, or rather monster (as Ctesias writeth), is bred among the Indians, hauing a treble row of teeth below and aboue, whose greatnesse, roughnesse, and feete are like a Lyons, his face and eares like vnto a mans, his eies gray and collour red, hiss taile like the taile of a Scorpion of the earth, armed with a sting, casting forth sharp pointed quils, his voice like the voice of a small trumpet or pipe."

A long chapter is devoted to the Unicorn, in which he discusses the probabilities of the existence of such a beast, "whereof diuers people in every age of the worlde haue made great question."

The Rev. E. Topsell, however, is quite satisfied of its existence, and he silences his opponents with the following unanswerable arguments :—

* It is from this description that the artist has evolved the drawing, of which we gave a copy last month, omitting the well-developed *ἀνδρεῖον αἰδοῖον*.

"David, in the 92 Psalm, says, 'My horn shall bee lifted vp like the horn of a Vnicorne,' whereupon all Divines that ever wrote have not only collected that there is a Vnicorne, but also affirme the similitude to be betwixt the kingdome of Dauid and the horne of the Unicorne, that as the horne of the Unicorne is wholesome to all beasts and creatures, so should the kingdom of *Dauid* be in the generation of Christ. And do we think that *Dauid* would compare the vertue of his kingdom and the redemption of the world unto a thing that is not, or is vncertain and fantastical. The Lord speaketh in this manner to Iob, Will the Vnicorne rest and serue, or tarry beside thy cratches (Mangers, from this word is derived the name of the childs game of scratch cradle, properly cratch cradle or manger-cradle, in allusion to the manger at Bethlehem), canst thou bind the Vnicorne with a halter to thy plough to make furrows, or will he make plaine the clots of the vallies? Likewise the prophecy of Esay, the 34 chap., and in many other places of Scripture, whereby God himselfe must needs be traduced if there be no Vnicorne in the world."

Among the varieties of sheep described, he includes one of somewhat doubtful existence, viz. the Musmon or Musimon of Latin authors, and which was supposed to be a cross between a ram and a goat. "Pliny makes mention of a beast called Ophion,* and he saith hee found the remembrance of in the Græcian books, but he thinketh that in his time there was none of them to be found in the worlde; heerein he speaketh like a man that did not knowe God, for it is not to be thought that hee which created so many kindes of beasts at the beginning, and conserued of every kind two, male and female, at the generall deluge, would not afterward permit them to be destroyed till the worldes end, nor then neither, for seeing it is apparent by holy scriptures that after the world ended al Creatures and beastes shall remain vpon earth as the monuments of the first six daies worke of Almighty God for the further manifestation of his glory, wisedome, and goodnes, it is unreasonable to imagine that any of them shall perish in general in this world." If this theory be true, naturalists may reasonably hope to find the Dodo and great Auk still existing.

Many of our readers will, we fear, be inclined to ask the use of rescuing from oblivion the errors and fallacies published centuries ago. From a scientific stand-point the answer must, perhaps, be in the negative; but may it not be worth our while occasionally to take a retrospective glance, if only to ascertain the progress that has been made? And it ought also to teach us to avoid dogmatizing—one of the greatest faults a scientific mind can be guilty of. Apart from its scientific merits or demerits, this book is of considerable interest to the student of English,

* This, Topsell says, is identical with the Musmon.

particularly with regard to its orthography. Many peculiarities will be noticed in the extracts we have given; for example, the indifferent use of *v* and *u*; the occasional reduplication of the final consonants in nouns, to which an *e* is sometimes added; the termination *ness*, with only one *s*; and the omission of the ' in the possessive case. Some of the woodcuts are fairly well executed, and occupy a whole page.

The book concludes with an epilogue to the reader, in which he says: "I do require al men of consieence that shall euer read or see these Histories, or wish for a sight of the residue, to help vs with knowledge, and to certifie their particular experiences in any kinde or any one of the liuing Beastes, and with all to consider how great a task we do vndertake, trauelling for the content and benefit of other men, and therefore how acceptable it would be vnto vs, and procure euerlasting memorie to themselues, to be helpers, encouragers, ayders, procurers, maintainers, and abettours to such labor and needfull endeuour as was never before enterprized in England. . . . .

Farewell."

A NEW COLLECTING BOX.

SOME time ago you did me the honour of admitting to your pages illustrations of the "Sear" collecting bottle, which I have reason to know has been useful to many naturalists. I now beg to introduce to them a little contrivance which I have

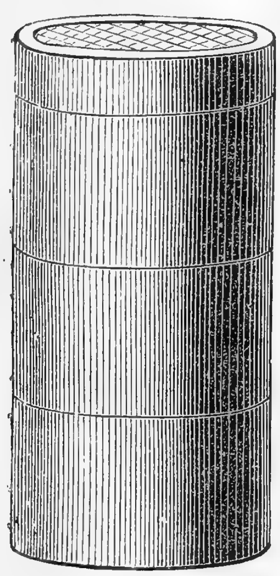


Fig. 221.—New Collecting Box, ½ full-size, closed.

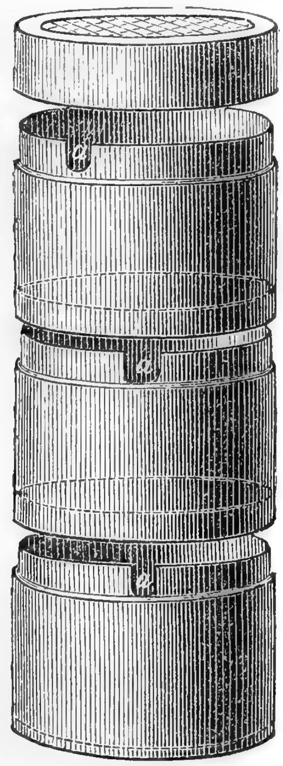


Fig. 222.—Ditto, ⅝ full-size, open.

tested, and found good for practical work, in the form of a light tin collecting box. The annexed sketches are almost self-explanatory. The notches at *a a a* allow the introduction of "small deer" without imperilling the escape of previous captures. The dotted circles show the position of the bottoms of the boxes, all of which are like the top A, made of fine wire gauze, and thus the specimens are kept separate while air passes freely to all. The collector can open his case hours or even days after his excursion

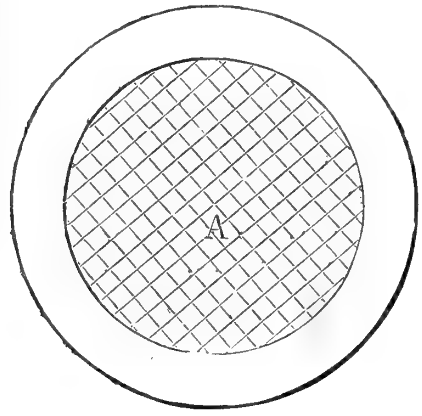


Fig. 223.—Annular Top of ditto, with wire lattice, full size.

without the certainty which exists in pill-box captures of finding half his subjects smothered, and the other half destroyed by ferocious companions.

The box is very strong, very light, and inexpensive, and may be obtained of Messrs. Thomas Bentley & Co., of Margate, to whom I have given the pattern.

W. LANE SEAR.

A FEW WORDS ABOUT A LITTLE GNAT.

ON the 1st July a friend gave me two ounces of Thames water, which had been drawn from the cistern supplying his house; and this small quantity contained more than thirty worm-shaped creatures, which, upon examination, I found to be the larvæ of some kind of gnat: the largest were about a quarter of an inch long.

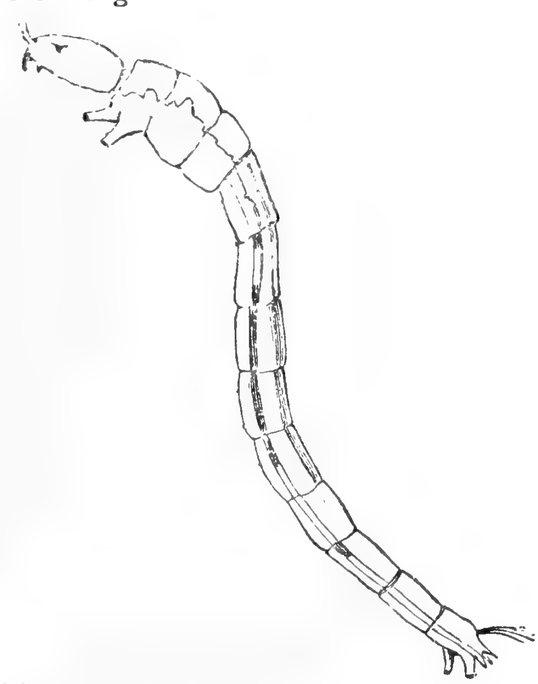


Fig. 224.—Larva of Gnat, natural size ¼-inch.

The larva of this species has a brown head, with the eyes, mandibles, and a fine line round the neck, dark brown; the thorax and the abdomen pale green. Two prolegs project from the under side of the prothorax, and two from the last segment of the abdomen, which has also, at its extremity, three

appendages, and on the top two pencils of hair, each pencil being supported on a short stalk.

I put my specimens into a small glass vessel. After some hours I found several tubes of cobweb-like texture, open at both ends, and slightly tapering, attached to the sides of it, and in each tube a larva, which, holding on by the anal prolegs, gave to its body a vertical serpentine motion, which made a current of water to flow through the tube. About once a minute it would contract itself, and then, pressing its head against the sides of the tube, collect with its conspicuous mandibles and devour such of those solid particles which had been drawn in by the current and were entangled in the tube, as suited its taste, and occasionally it would turn about and collect at the narrow end, but it always brought its head back to its old position at the larger end before it commenced pumping again.

This larva does not come to the surface of the water to breathe, neither does the pupa, which also lives in a tube, and makes the water flow through it by the undulations of its body, just as the larva did, in order, I presume, to bring the air contained in the water into contact with the hairy fringes which border the segments of its abdomen; certainly not to obtain food, for it does not eat. It has no hairs on the thorax like those represented in the figures of *Chironomus flumosus.*

I was amused to see that each of my pupæ kept its old head under its body, where it rocked to and fro with each wave of its abdomen; there it was, with its dark jaws, its little eyes, and neat brown collar, and with the same comical, Japanese kind of expression that it had when it was in its old place. When the pupæ were about three days old they left their tubes, and after swimming, or rather throwing themselves about with the most violent contortions for three hours or so, and now frequently coming to the surface, they remained there for a little while, and then the transformation took place.

Although I watched my captives pretty closely, many of them changed their state unobserved. Once, when I went away for two minutes only, I found on my return the gnat creeping up the side of the vessel. At last I was fortunate enough to see one come out. It did not free itself in a careful, deliberate manner, like the common gnat, which, sailing about in its pupa skin, gently extracts its anterior legs, and, after carefully placing these on the water, proceeds to liberate the next pair, and so on; but it came forth as though it were being steadily squeezed out, and then immediately flew away, the whole operation occupying just fifteen seconds!

I had previously placed a pupa on the stage of my microscope in order to examine it; but before I had time to do so, the skin parted, the head appeared, and in about eighteen seconds the whole imago was out.

My specimens lived a month as larvæ, and from three to four days as pupæ. I am sorry that I have been unable to obtain the name of this insect. I think it is allied, if it does not belong, to the genus Chironomus. The imago is 1½ line long. The two anterior legs are distant from the others, and the rostrum is short.

The female is yellow, and has short antennæ, of few joints, the terminal one being the largest; the male is darker, with the abdomen greenish-brown; the tibiæ and tarsi dusky; the antennæ plumose, of many moniliform joints, with the terminal one cylindrical, and very long.—*Edward Cox, Brixton.*

A TOUR IN SEARCH OF FOSSILS.

THE experiences of a collector during a run from Edinburgh to Bristol, and a stay of twelve days at the latter place, may, perhaps, be interesting to the readers of SCIENCE-GOSSIP.

The first halting-place was Settle, in Yorkshire, classic ground to the brachiopodist, mainly through the labours of Mr. John Burrow. Mr. Burrow was the son of a doctor of independent means, and spent his life in working out the palæontology of his district. He was known to all of the inhabitants of the town to whom I spoke, and an intelligent shoemaker, who occasionally accompanied him on his rounds, gave me what information he could, as to his habits and excursions. He described him as "rather dull-looking" as a lad, and as one from whose after-life no great things were to be expected. From what I had known of his work I was curious to find out as much as I could about him, wondering, as so much has recently been said of men in a humble grade of life who have worked in pretty much the same groove, what could be said of a man who was above them in the social scale; but I had not time to pursue such inquiries very far; the sum of what I learnt was that he was a man who spent nearly the whole of his time on the moors, that he worked hard, and, uniting quickness of eye and intelligence with zeal, was able to accomplish what he did. Mr. Davidson's monograph of the British Carboniferous Brachiopoda bears frequent testimony to his merits. His collection went to the Woodwardian Museum, at Cambridge, fetching a sum which, as he himself said, paid him scarcely at the rate of a halfpenny per hour for the time during which he had been making it. He died comparatively young.

A collector's first experience of Settle would probably be disappointing. It requires, above all things, time to know what a locality can produce, and a very considerable amount of patience and muscular activity to successfully work a locality that is known. Almost in accordance with my expectation, I found Settle exceedingly barren during the single day I was able to spend there. A few common Brachiopods only rewarded my labour, but these, with the beautiful mineralisation characteristic of the limestone of the district, were thought worthy of preservation. A

few good *Productus striatus* occasionally occurred on window-sills and over porches. Many good things were got when the new line between Settle and Carlisle was being constructed. The quarries scarcely repay a visit to the chance collector. The richer beds are not always worked, and the quarrymen do not seem to have much to offer. Fish remains, I was told, occur in the Dent marbles, a few miles further up the line, but I am not aware of any vertebrate remains having been found in the carboniferous limestones of the immediate vicinity.

The next halting-place was Dudley. The fossils, with which every palæontologist is familiar, are got at two places, the Wren's Nest and the Castle; neither place is far from the town. I spent a day at the Wren's Nest, but hadn't time to visit the Castle. The beds I saw were tilted at a sharp angle, and good weathered fossils are to be found in the *débris* at their base. The beds themselves are so crowded with organic remains that they offer the finest study possible of an important part of the world's ancient life. These remains, however, are not easy to transfer to the collecting-bag, and the geologist must betake himself to the various places where the softer shales have become disintegrated, and have yielded up a part of their fossil contents. His first feeling will be one of disappointment, even here, where he is aware of an enormous profusion of organisms, and, indeed, if his object be merely to secure fine cabinet-specimens, his disappointment will be keen; good trilobites and shells are not easily to be picked up, but if his object be of a more purely scientific kind, especially if he has learnt to feel much interest in the lower forms of animal life, he will not be dissatisfied with his gatherings. Novelties are, of course, not easy to find in a locality so long and often wrought as Dudley; but it appeared to me very probable, from the almost inexhaustible abundance of material to work upon, that something might even yet be obtained, especially in groups that have not yet received their full share of attention, as corals, polyzoa, sponges, &c. A week's good work would probably yield some interesting results. *Atrypa reticularis* seems to be the commonest fossil, and I mention it because I found the mineralisation exceedingly favourable to the preservation of the spires. Out of a handful thrown into acid, a large percentage yielded the desired result. If one is at all anxious to know whence all the good museum specimens have come, and makes inquiry, he finds that there is a band of men who make a business of collecting. They get good fossils still, and an old man, in particular, had quite recently made several valuable finds. It is hopeless to attempt to compete with such men, and the visitor who has thought of getting them for himself had better give up the idea, and make for the nearest dealer's shop. There are two semi-professional dealers at Dudley, a druggist, Mr. Hollier, and a herbalist, Mr. Fletcher. I only saw a few of Mr. Hollier's things, but Mr. Fletcher obligingly showed me what he had. He has some good trilobites, but seemed unwilling to part with them. I was told that there was a museum at the Mechanics' Institute, but it was too late to see it. The museum which was before it in date has become defunct, and its collection is scattered.

The neighbourhood of Bristol is perhaps as good a one for the palæontologist as any in the kingdom. Several horizons are well represented, and many of the best localities are easily accessible. I began work upon the inferior Oolite at Dundry. To give an idea of the richness of this locality, it may be mentioned that the quarry is exceedingly small, being used simply to obtain road-metal from, but that out of it have come an enormous number of genera and species, of which specimens occur in almost every museum and private cabinet in the country. At the Bristol Museum I counted from this locality 226 species distributed amongst 67 genera, but a complete list of what it has yielded would give a much higher figure. This great abundance of organic remains was a treat to one coming from the comparatively sterile horizons of Mid-Lothian.

The chief excavation is near the top and on the north side of Dundry-hill, close to the main road leading from Bristol to Dundry, and is two or three miles distant from the city. A little way down on the south side is another and smaller quarry, which I found rich in corals and large *Rhynchonellas*. It is of no use visiting the north quarry unless the workmen have been getting out some road-material; this they get in rather large fragments, and for a small fee will allow the visitor to set to work upon them, and gather for himself what he can. In breaking up the blocks for their own purposes, they put aside the better specimens themselves, and generally have some for sale. The sellers of minerals on the Clifton Downs usually have a few Dundry fossils on their stalls, in addition to a great many very beautiful polished carboniferous corals and sponges, which can be bought at a very cheap rate.

The well-known Rhœtic beds of Aust gave me occupation for a day. The fish remains occur on the surface of the *Avicula contorta* shales, and in bluish-grey seams which run irregularly through a coarse, pebbly-looking kind of rock. The beds are exhibited well up on the face of the cliffs, and the collector is dependent upon the crumbling away of the marl beneath for material to work upon. After a high tide with a strong westerly wind is the best time to visit the locality. A good deal of material was strewn about at the time when I was there, and a star-fish and *Hybodus* remains rewarded my search. To extract good reptilian or fish remains the collector must prepare himself for hard work, as the matrix is very intractable, but with patience, and a heavy hammer and sharp chisel, he will assuredly meet with good success. Ichthyologists have lamented that

so few *Ceratodus* teeth have been obtained in recent years. A partial explanation may be found in the fact of the hard work required to extract them. That the locality is rich in such remains is well known. The Higgins Collection recently acquired by the Bristol Museum is a striking proof of it. Many of the *Ceratodus* teeth of this collection are figured in Mr. Miall's monograph just published. If the visitor at Aust wishes to spare himself trouble, he may sometimes find a few things at one of the cottages in the village. There does not seem to be any well-sustained effort in any quarter at present at extracting the riches of the locality.

At first view the limestones at Clifton seem barren, but a little careful research soon opens up a better prospect. Mr. Emery, a gatekeeper at the Suspension Bridge, obligingly rendered me very material assistance. His knowledge of the carboniferous limestone of his district is both accurate and extensive, and he has made vthe aluable discovery of seams of Rhœtic in the limestone of the Durdham Downs. The upper shales I found exceedingly fossiliferous, and at no greater distance than the new buildings on the Leigh side there were beds exposed in which fine Brachiopods were abundant. The "Black-rock" quarry, which has yielded such good fish remains, is unfortunately closed. Wishing to examine the carboniferous limestone of the Mendip Hills in Somerset, I found myself, almost by accident, in Burrington Combe, a glen produced apparently by the same causes as those which have hollowed out the gorge of the Cheddar Cliffs, with which it is in line, but on the opposite slope of the hills. This combe is of considerable interest both to the physical geologist and palæontologist. The section exposed is one of very considerable thickness, and the fossil-bearing beds are accessible. Brachiopods, lamellibranchs, gasteropods, and corals were abundant. Good *Psammodus* teeth would reward the diligent collector. A fine one fell to my share. High up on the right-hand side, almost halfway up the combe, I came upon some shales from which the earth had fallen, and was delighted at the display of organic remains. The dip of the beds was about the same as that of Dudley, which I had just seen, and the profusion of extinct life nearly as great. The fossils I observed were chiefly referable to the genera *Chonetes* and *Spirifera, S. cuspidata* being quite common. I am not aware that this locality has been much wrought, but it would unquestionably repay any good work spent upon it.

Two days upon the inferior Oolite of Bradford, Wilts, and Minchinhampton, Gloucestershire, concluded the field work of the excursion, and the short time that remained was spent at the Bristol Museum. There is evidence of good work in this museum, especially on the part of the geologists and malacologists. It possesses several very valuable type specimens, and is, on the whole, well arranged for the display of its collections. It has no funds for purchases, and when the Higgins Collection was in the market had to resort to the expedient of a public subscription to secure it, but in spite of this drawback it has done exceedingly well, and has received many valuable donations. The late Mr. Sanders took great interest in it, Mr. Etheridge, palæontologist to the English Geological Survey, and many others, have contributed largely to increase the number and value of its specimens, and the zeal of the gentleman, recently its curator, and now of the Woodwardian Museum at Cambridge, has done much to bring it to its present satisfactory state. It occupies beautiful premises on a good site. The upper hall is devoted to Mineralogy, Palæontology, and recent shells. The fossils are arranged in table-cases, in stratigraphical order, and the light is all that could be wished. A striking feature is the *Ichthyosaurus*, completely extracted from the matrix, and suspended from an iron support. This way of mounting, as novel as instructive, arose out of a mistake. The wrong faces of the blocks were, in some instances, developed, rendering it necessary for the remains to be entirely extracted, if the specimen was not to be spoiled.

The lower hall is devoted to Ethnography and recent Zoology. I was sorry and rather surprised to hear that more use was not made of this part of the Natural History collections. The attendance of students is almost *nil*. No attempt seems to have been yet made by those who have the direction of what biological teaching exists at Bristol, to take advantage of the facilities which the museum offers.

Edinburgh. T. STOCK.

AN AUTUMN RAMBLE IN EPPING FOREST.

BY DR. DE CRESPIGNY.

PART II.

THE genus *Coprinus* has membranous gills, which become black (with the black spores)* when fully developed, and finally deliquescent. *Coprinus comatus* we gathered in a pasturage below the warren. It is a singular-looking fungus, edible, and remarkable for its scaly cuticle: the scales are seen in the figure as tufted and revolute at their ends. In the same pasture grew another and pretty little species called *C. plicatilis,* with plicato-sulcate pileus and small umbone. As it is a good example of this kind of pileus, a figure in illustration is subjoined. A good specimen of the genus *Cortinarius* we gathered in *Inoloma* (*C.*) *violaceus,* said by Mr. Worthington Smith to be one of the very best for esculent purposes. *Cortinarius* has been subdivided into six sections; they have all persistent membranous gills and a floccose trama; a veil of arachnoid threads and rust-

* Specimens of the black spore section of *Agaricus* may be found on dung-hills everywhere in *A.* (*Coprinarius* or *Panæolus*) *separatus.*

coloured spores. When torn or otherwise dissipated, the remains of the veil may be usually discerned as stains upon the bulbous stipe; but the violet tinge upon the stipe is not constant, nor is the pileus violet except when quite young. It is by no means common.

Most of the smaller specimens of fungi, which grew upon leaves or on the ground, were damaged. We made out, however, that the subgenus *Myxænim* is well represented.

Fig. 225.—Vertical section of *Coprinus comatus*, showing the narrow pileus and scaly cuticle, crowded gills and cavity of the stem filled with filmy reticular tissue, supported by a central columella.

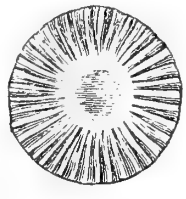


Fig. 226.—Pileus of *Coprinus plicatilis.*

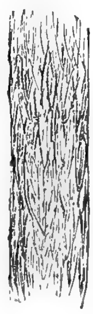


Fig. 227.—Stem of *Marasmius oreades* covered with a woven villous coat (mag.)

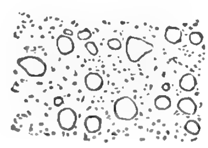


Fig. 228.—Vesicular trama of *Lactarius* and *Russula.*

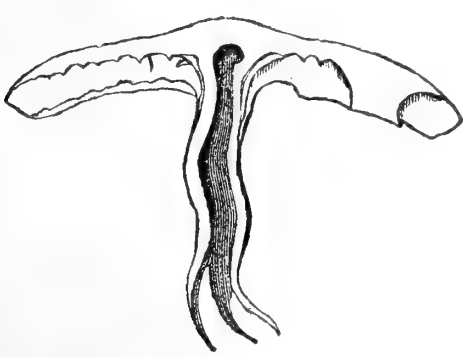
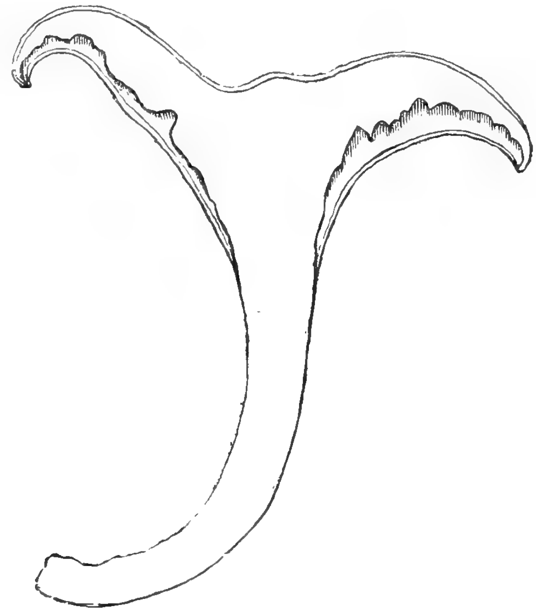


Fig. 229.—Vertical section of *Hygrophorus psittacinus* showing the hollow splitting stipe, &c.

Hygrophorus is characterized by its waxy hymenium, hymenophorum continuous with the stem and descending unchanged into the sharp-edged gills. Specimens of *H. psittacinus* we obtained from a wet pasturage: the colour of pileus, gills, and stem is of a crocus yellow, tinged here and there, on the gills especially, with grass-green in the young plants, the stipes hollow and splitting; the hymenium, too, has a tendency to separate from the trama when dry.

Lactarius is well represented. *L. subdulcis* is extremely plentiful. The gills and flesh are milky in this genus, the trama vesiculose, hymenophorum confluent with the stem; two or three of this species which are of a rufous or cinnamon-brown colour are much alike; the milk of *L. serifluus*, however, is watery, and that of *L. fuliginosus* turns yellowish. A specimen of *L. blennius*, pileus greenish-grey, gills white, was also gathered.



230.—Vertical section of a *Lactarius.*

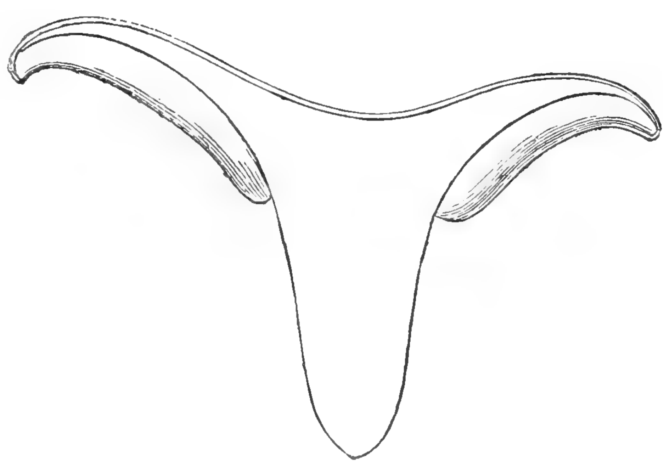


Fig. 231.—Vertical section of *Russula nigricans.*

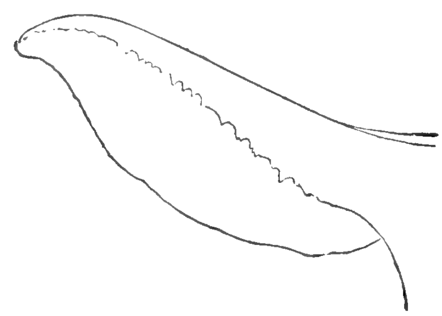


Fig. 232.—Hymenophyllum of a *Russula* confluent with the vesicular trama (*R. heterophylla*).

Equally abundant with *Lactarius* were species of *Russula.* The structural characteristics of this genus are precisely the same as those of the preceding, except that the flesh is not milky. Very common was *Russula heterophylla*, pileus of all shades of dull yellow, greenish, purplish, and dull red; frequent

R. fragilis, red when young, but white and polished afterwards, viscid. Another common species is *Russula nigricans*, dark greyish green or dingy olive, becoming charred as well as the stem, when old; umbilicate, as are the Russulas generally, and with the margins of the elevated borders inflected; the gills are white with a black border.

Cantharellus cibarius is sometimes plentiful in Epping Forest. It may be known by its golden-yellow colour, infundibuliform pileus, and gills reduced to mere folds or swollen veins. We could obtain no specimen to illustrate this curious structure of hymenium. The genus has a floccose trama; gills in other species thick, swollen, and obtuse.

Marasmius is another genus in which the trama is floccose; the hymenophorum confluent with the stem, although of different structure; not confined to the lamellæ, but spread over all the interstices. *M. Oreades* is said to be good eating, grows on dry pastures, generally in rings (the circle is rarely complete) of from six to eight feet broad. The whole plant is of a dirty cream-colour, pileus more or less slightly stained with brown, and seldom more than an inch or two in diameter. We found them on a common near Woodford.

Intermediate between the gillbearing Hymenomycetes, and those with a porous hymenium, are the two curious genera, *Lenzites* and *Dædalea*, both of common occurrence in forests, and of which the former is retained in the first-mentioned family, and *Dædalea* in the latter; but the fact is, when fully developed, it is very difficult, out of a number of specimens, to decide which is which. Nature is very unaccommodating, and refuses to be tied hard and fast by laws and rules, as laid down in the books which treat of her phenomena. The lamellæ of *Dædalea* are indeed sometimes so much broken up, in old plants, as to resemble the toothed processes characteristic of the hymenium of a *Hydnum*.

FOSSIL POLYZOA.

The Genus Fenestella: its History, Development, and Range in Space and Time.

By George Robert Vine.

History of the Genus.

In these papers I do not wish to discuss questions that are purely geological. I wish to deal only with one type of a class, out of many of the classes which fall naturally into the divisional roll of the palæontologist. But while keeping this before me as a guide, I cannot ignore the fact that in speaking of formations it will be necessary to either enlarge or restrict my meaning when I use certain terms. In speaking of the Silurian System, this was not so much needed, but in speaking of the *Fenestella* of the Devonian system it will be necessary to limit my meaning, as my remarks on the species will apply more particularly to the typical Devonian rocks of Devon and Cornwall.

In 1841, Mr. John Phillips published his elaborate work on the Geology of Cornwall, Devon, and West Somersetshire. In this work there are numerous plates of Fossils, with letterpress descriptions of the same. Figures and descriptions are given of these species of *Fenestella*, for in this work Phillips discards the word *Retepora*, and uses Miller's more expressive term. The specific character of *F. laxa* is similar to that given in his Geology of Yorkshire. "The network is extremely large and irregular, the obverse bearing two rows of tubular pores, reverse granulously striated," and the localities are S. Petherwin and Croyde. Of the *F. antiqua* Goldfuss, Phillips gives several very good figures, and his description is little more precise. He says of one of his figures (35*a*), *F. antiqua var.* that the specimen was sub-conical, and that the celluliferous face was external. This is clearly a mistake, for even from the figure it seems to give an idea that the polyzoon was parasitic on some object. The corallum was irregular, with thick, slightly flexuous interstices, very obtusely carinated; the dissepiments were thick and short, and placed at regular intervals; the fenestrules were oblong, and the pores were small, with slight prominent margins about their own diameter apart, and usually about three to the fenestrule. The species and varieties are common in the Devonian Limestone of Plymouth. This description applies to Goldfuss' figure of *Retepora antiqua*, and not to Lonsdale's *F. antiqua* of the Silurian System. *F. anthritica* is another of the Devonian species, but it is not very well described. The figures are very good, but I cannot make much out of them. The *Hemitrypa oculata* of South Devon seems to me to be clearly a *Fenestella*. It is a thin laminar expansion in a cup-formed mass. The external surface is wholly covered with numerous round pores or cells radiating from a centre, and associated in double rows, which near the centre undergo frequent divisions, so as to form two such rows. The figures seem to bear, in some respect, the character of *Hemitrypa Hibernica*, and also to the *Fenestella* (?) *Sykesii* of De Koninck. One of Phillips's drawings, fig. 38 E., is decidedly characteristic of the *Fenestella* type, and one would have no hesitation in placing it with that group. I have been rather more particular with Phillips's Devonian *Fenestella* than I should have been had the work been less scarce. As it is, I have done my best to furnish the student with his specific characters in this history of the Genus.

Several American Devonian species of *Fenestella* have been figured and described by H. A. Nicholson, Professor of Biology, in his work on "Ontario," and in the Geological Magazine for 1874-5. Some of these new forms are very characteristic, and although they bear

different specific names, there is a tendency of some to ally with Silurian, while others approach Carboniferous species in character. But every fragment given by Nicholson is well described—a property that adds much to the value of his specimens. One of these, *Fenestella magnifica*, bears a close resemblance in its non-poriferous aspect to *F. laxa* of Phillips. To this particular point Nicholson himself draws the attention of the reader. I do not, however, set a very high value upon Phillips' *F. laxa* from the Carboniferous or Devonian series. It is very loosely described, and very loosely figured, both in his Palæozoic Fossils, and in his Geology of Yorkshire. Nicholson's species, then, has this advantage over the older description; it is well figured and well described. The poriferous aspect is unknown. He says: "I have only seen a single specimen of *F. magnifica*, and that only exhibits the reverse side of the cœnecium, but the general character of the frond so distinctive, that I have no hesitation in founding a distinct species for its reception. It is from the Carboniferous Limestone of Port Colborne, Canada."*

F. marginalis (Nich.) is a very peculiar species. It is described from a mere fragment, but the character is distinct. The polyzoary was fan-shaped, but of unknown dimensions.† In his critical remarks, Nicholson says: "The specimen does not enable me to affirm with certainty that the two marginal rows of cells were separated by a medium keel, but it appears highly probable that this was the case. In the genus, or sub-genus, *Fenestrellina* (D'Orbigny), the mesial keel, separating the two rows of large lateral cells, carries a central row of minute cells. In *F. marginalis*, however, the space between the lateral rows of cells carries a series of minute crowded cells, which are arranged in two, or sometimes in three, alternating rows; so that the central keel, if present, must have exhibited the openings of two or three rows of cells. This character, so far as I am aware, has not hitherto been noticed in any species of *Fenestella*, except *F. rigidula* (M'Coy), and it may, perhaps, afford a ground of sub-generic distinction."‡

Fenestella filiformis (Nicholson) is the most beautiful and delicate *Fenestella* that I have ever seen. It is finer in the branches than the finest and most delicate of any of my Carboniferous species. The specimens are only in fragments, and the celluliferous aspect is unknown. Of the branches, Nicholson says, fifteen or sixteen of these occupy the space of a quarter of an inch.

Another species from the Hamilton group of the Devonians of America is figured and described by Nicholson, which he dedicates to his friend Davidson. It is the *Fenestella Davidsoni*. From the peculiar growth of the frond, it approaches nearest in character to the *F. Milleri*, of Lonsdale, but both the branches, fenestrules, and number and character of cells are altogether different from that species. "In the general aspect of the celluliferous surface and the sinuous course of the branches, the species makes a close approach to some of the species of the genus *Retepora*; but the presence of non-poriferous dissepiments, and the existence of a keel separating two rows of cells, seem to justify its reference to the genus *Fenestella*."* In his "Ontario," Nicholson gives another species, *F. nervata*, but having no access to his work, I am unable to describe it.

There is a striking peculiarity, however, about the Silurian and the Devonian *Fenestella* when compared with the Carboniferous species, which marks them as distinct. But there are no arbitrary lines about any of the Palæozoic group, except in the *F. rigidula* and *F. marginalis*. If the poriferous character of the keel, or the place the keel should occupy, has not been exaggerated, this is peculiar; but, as I have been myself very much deceived in the apparently poriferous keel,† I merely record my doubt, with all due respect to the describers of these species. Some specimens, too, show this poriferous keel *outwardly*, but when reduced to sections, the real cells are contiguous, and all the keel that exists is the thin, wavy line which separates the two rows of cells, and even this apparent line is nothing more than the impingement of the walls of the separate cells one upon the other.

The *Fenestella* group seems to have reached its climax in the Carboniferous seas. No fewer than twenty-two species have been described by Phillips, M'Coy, and others, to which Mr. Robert Etheridge, jun., has added two others from the Scottish series of Carboniferous shales. Many of these species are fictitious; the characters of some of them have been described from fragments of other species. As, however, my friend G. W. Shrubsole, F.G.S., is engaged on a complete revision of the Carboniferous *Fenestella*, I will just here indicate the specific character of a few only of the list. *F. membranace*, Phillips, is a well-marked and characteristic species. It is elongate and conical, bearing—generally—three small pores on each side of the fenestrule; it has, moreover, long, solid non-poriferous roots. *F. antiqua*, Lonsdale, *Retepora antiqua*, Goldfuss, and *F. sub-antiqua*, D'Orb., are included with this species as synonyms. *F. flabellata*, Phillips, vary very much in different

* Geo. Mag., May, 1874, p. 197.

† As the descriptions of these species are easily accessible to the geological student, I do no more than draw his attention to a few of the minute details of Nicholson—reference to the larger description will well repay him for the trouble.

‡ Prof. H. H. Nicholson. New Devonian Fossils, Geo. Mag., May, 1874.

* Geo. Mag., 1875.

† "I believe that all that has been written about poriferous keels on the Fenestella is wrong, and that these so-called pores are only worn-down rows of tubercules. Like you, I have sectioned specimens showing these worn tubercules, and find they lead to nothing, and have no connection with the cells."—Mr. John Young, F.G.S.

localities. It is fan-shape in character; but the branches of specimens from Richmond, in Yorkshire, differ materially from those found in North Wales. It often presents two different characters in well-developed fronds—so much so that if a good frond was broken and distributed to several Palæontologists, asking them to identify the species, two sets of opinions would be the result. *F. frutex*, M'Coy, seems to be a good species, so also are the *F. polyporata*, and the *F. undulata*, of the same author; but *F. nodulosa*, and *F. tenuifila*, are somewhat doubtful. The *F. formosa*, of M'Coy, is also doubtful in the character of the poriferous dissepiment; but the *F. plebeia*, *F. quadradecemalis*, and the *F. carinata*, of the same author, have pretty constant characters. The *F. crassa*, and *F. ejuncida*, are doubtful. The *F. hemispherica* is a beautiful specimen, but may it not be the young form of some of the larger specimens described as species? Besides these forms there are several others in my list, but after having examined many of the fine species gathered by Mr. Shrubsole from the Halkyn Mountains of North Wales, I am rather in favour of a reduction than of an extension of species. My belief is that many of the so-called species are the result of indiscriminate grouping. The fault of the confusion, is not so much pressed home upon the describer as upon the collector. It may be that no *Fenestella* bands have been so well preserved as are those of the Halkyn Mountain group; and it may be that collectors have been more careful for general, than for particular fossils. Be that as it may, the group well deserves revision, and having a sufficient knowledge of the material at his disposal, I believe the work will be well and honestly done by Mr. Shrubsole.

The *Fenestella* of the Permian rocks are few in number—both as regards species and individuals. The form generally met with in collections is *F. reticularis*, of Schlol. In Morris' Catalogue this is given as *F. retiformis*, with the synonyms *Keratophytes*, *Gorgonia infundibuliformis*, Goldfuss, and *Retepora flustracea*, Phillips, but as my own specimens show only the non-poriferous side, I am unable to give any minute details respecting the species. The non-poriferous aspect bears a close resemblance to some of the Carboniferous, and also of the Silurian *Fenestella;* dependence, however, upon this is unsafe as a palæontological guide.

In space this genus had a remarkably wide range; it being tolerably abundant in the Palæozoic series of America. In this country the foregoing remarks will justify my assertion that it was also abundant with us. De Koninck and others have shown how prevalent certain species are in the Bohemian and Belgian series, some of the species belonging to the latter extending as far east as India. In time the genus ranged throughout the whole of the Palæozoic rocks, becoming extinct, so far as is yet known, at the close of the Permian era.

MICROSCOPY.

VARNISH FOR GLYCERINE MOUNTS.—Some time since I asked in SCIENCE-GOSSIP for some varnish which would not be affected by glycerine jelly. No satisfactory answer being given, I had to fall back on my own experiments, and am glad to say I have at last found a varnish, which, worked with others, answers in the best possible manner. The varnish I allude to is gold size, and I find the following method of applying it answer best. Having mounted your slide, and allowed time for the glycerine to set, go carefully round the thin glass circle with a warm penknife, then with a fine camel's-hair brush run a ring of gold size round, by means of the turn-table; allow this to dry, then apply another layer, and when this is dry a third; lastly, run a ring of white lead varnish over the gold size, and finish with a ring of green varnish in the centre of the white if your object be a vegetable preparation, or red, if it be animal. I have mounted some dozens of slides in this way, and in *no case* have I so far found the varnish to fail. Let me recommend readers of SCIENCE-GOSSIP, who like myself have had a difficulty in finding a *stable* varnish, to give this method a fair trial. Dr. Carpenter in his work, "The Microscope," it will be remembered, speaks highly of gold size as a varnish. I consider, however, that without some varnish over it, gold size does not make a very neat or a very elegant appearance.—*Charles F. W. T. Williams, the Vicarage, Tinslade, Bucks.*

NEW DIATOMS.—*Melosira Barreri* (Grev.) var. *Hispida Castracane.* This variety is distinguished from the type form by the presence of short teeth or spines scattered over the surface of the valves, but especially on the lower convexity of the frustule. Canal de Trau, Dalmatia, Cyclophora, n.g. *Castracana*, frustules tabular, rectangular, sometimes in series, sometimes free, sometimes connected by a gelatinous isthmus forming a zigzag chain in f.v. linear-oblong, sometimes slightly inflated, valves unequal, one of them with a central loculus, living in sea-water. *Cyclophora tenuis*, Castracane; frustules in f.v. oblong, rectangular, slightly inflated, valves linear, inflated, rounded at the ends, dissimilar, one of which has a central ring or loculus. Length of valve, 44μ 5, 55μ, 2, breadth 4μ 8, 11μ 3. On rocks at Ancona; Naples, in aquarium. (Extracted from *Brebissonia*, a new monthly serial devoted to Algæology and Micrographic Botany, edited by M. G. Huberson.)

DIATOMS IN COAL.—It is, perhaps, in the recollection of our readers, that about two years ago, Count Castracane announced the discovery of marine and fresh-water diatoms in coal ashes. Professor W. C. Williamson, at the Dublin meeting of the British Association, doubted the accuracy of this, and stated that Professor Roscoe had permitted one of

his ablest assistants to make analyses of various kinds of coal, in accordance with Count Castracane's directions, and these ashes he (Professor Williamson) had carefully examined, but had been unable to detect any traces of diatomaceæ. I can confirm this, having myself made many observations on the ashes of various kinds of coal and coal shales; many of the latter were rich in the remains of equisetums and ferns, and ought to have contained diatoms, if any existed at that period. So acute an observer as Count Castracane could not be mistaken as to the presence of diatoms in the ashes he examined, and we must, therefore, come to the conclusion that their presence was accidental. I have examined very many samples of chalk, not only from this country, but also from various other localities, but have never seen any valves of diatomaceæ. I should be glad to learn if any other observer has been more successful.—*F. Kitton, Norwich.*

A COLLECTING STICK.—The following is a description of a collecting stick I have made, and found very useful in collecting diatoms from the bottom of streams, as it does not disturb the mud and sand, like the ordinary collecting bottle. A is a bamboo-cane,

Fig. 233.—Collecting Stick.

with a piece of Indian-rubber tubing running down the centre, such as is used for feeding-bottles; B is a glass-tube fastened to rubber-tube; C is an Indian-rubber ball, by squeezing which you force air out of the glass-tube, and then by placing it near the object you wish to get, and letting the ball expand, the object is drawn up into the tube. On squeezing the ball it is then forced out into the bottle. The stick can be also used as an ordinary walking stick.—*Albert Smith.*

ZOOLOGY.

HOW TO PRESERVE SKINS, &c.—I can give your correspondent J. Y. a really good non-poisonous receipt. It has stood the test of fifteen years, and can be well relied on, viz.:—1. Whiting or chalk, 1½ lb.; 2. Soft-soap, 1 lb.; 3. Chloride of lime, 2 oz. Boil Nos. 1 and 2 with about a pint of water, and add No. 3 while hot. Before adding the lime see that it is finely powdered, or else it will not work smoothly. Another good one is as follows:—Burnt alum, 1 lb.; saltpetre, ¼ lb.; pound and thoroughly mix. This is especially for animals, as when well rubbed in it will fix the fur and hair admirably, and penetrate the thickest skin.—*Edward E. Evans.*

MIMICRY AMONG VERTEBRATA.—Mr. Wallace, in his work on "Natural Selection," by way of enforcing his arguments, quotes instances of mimicry among *snakes* only. In the beginning of 1877, when I was stationed at Shwaegyeng, in British Burmah, a wild dog was brought to me, and on the first glance I thought it was a young deer! The resemblance was striking in many ways; colour, form, and motions of small deer were imitated in a wonderfully deceptive manner. The head especially was remarkable for its resemblance to the head of a doe, the ears were long and very mobile, and could be thrown back on to the neck in a way habitual to the female of the common hog deer. These wild dogs are rare, but they are to be found on the plains of Burmah, and, as may be readily inferred, they prey upon the small deer which abound in the grassy plains of that country. I kept the animal for several days; it was a young one, and was very fierce. I sent it down to Rangoon as an exhibit for the Phayre Museum and Menagerie there, but the creature died on the way, and the person in charge unfortunately threw away the carcase, instead of preserving it. I hope shortly to be able to get another of these animals, and shall do my best to send it alive to England.—*Arthur Hough.*

PRONUNCIATION OF SCIENTIFIC NAMES.—Mr. Browne (see July No.) is no doubt right in his suggestion that the Latin qu was originally pronounced like k. In the memoir prefixed to the "*De Naturis Rerum*" of Alex. Necham (born 1157) the following anecdote is related. "Necham abandoned his school at Dunstable, and became desirous of entering one of the monasteries, and he first turned his eyes to the great Benedictine monastery in his native town of St. Alban's. He accordingly addressed an application to the Abbot in these terms, *Si vis veniam sin autem, &c.*, to which the Abbot, who appears to have been somewhat of a wag, replied, *Si bonus es venias, si nequam nequaquam*" (If you are good, come; if bad, by no means come). Nequam of course being pronounced necham, this pun on his name offended him, and he did not join the St. Alban's monastery.—*F. Kitton.*

THE ALTERNATE GENERATION OF THE ECHINODERMATA.—Professor Hæckel has recently sent the following to the San Francisco Microscopical Society:—"The palingenetic development of the Echinodermata, ordinarily known as metamorphosis, which leads to important inferences as to their race history, is to be considered as a genuine alternation of generations, and especially for this reason, that the two succeeding generations are destroyed in order to make possible the change into one another by a single transformation. The first generation, the 'Nurse,' or so-called larva, is a solitary, bilateral, limbless individual or 'person,' which consists of only one piece or antimera, and possesses the greatest resemblance to true worm larvæ. On the contrary, the second generation, the perfected echinoderm, has the ground-plan of a symmetrical, five-sided pyramid,

and consists of five antimera or parts; it forms a true stock or cormus, which is composed of five articulated, worm-like, bilateral persons. When this cormus originates within the nurse by budding, a multiplication of antimera occurs, whereby from one antimera five arise. This origin can be interpreted only as a non-sexual reproduction, not as a mere transformation. The true nature of these genuine alternate generations is clearly shown by those sea-stars, in which the body remains free from the five (or more) independent arms, and the central disk, which barely unites the latter in the middle, exists almost as an independent body. These are *Ophidiaster*, *Chætaster*, *Brisinga*, &c. Particularly interesting in this relation are most species of the genus *Ophidiaster*, or Linckia, from which several specimens are exhibited (*O. diplax*, *O. ornithopus*, *O. multiformis*, and *O. Ehrenbergii*). Here the single arm, which possesses the morphological value of an articulate worm, is freely detached from the disk, and every arm forms by regeneration both the central disk and the four remaining arms. With numerous specimens of the four species of *Ophidiaster* selected, all the various stages of this reproduction process were shown, and he discussed the significance which these so-called comet forms of sea-stars possess for the morphological interpretation of the same. Therefore we should take as the oldest stem form of the Echinodermata the Asteroidea, from which as diverging branches have developed *Ophipridea*, *Crinoidea*, and *Echinoidea*. In the last, the centralization of the whole cormus is carried farthest, and from them the *Holothuroidea* have arisen. Thus the Holothuroidea stand most distant from the original form of the Echinodermata—the Asteroidea."

BOTANY.

COTONEASTER VULGARIS.—This plant still exists in small quantities on the Orme's Head. I saw it there in July last.—*James Britton.*

POLYPOGON LITTORALIS.—This rare plant, which does not appear to have been recorded for Gloucestershire, occurred this year in considerable quantity, on marshy ground, near the north bank of the Avon river at Bristol. On inquiry it seems that the soil here has been taken from the river bank and bed at places much nearer Clifton, when the river was widened and the new dock-gates constructed, and brought to this marsh to fill hollows from which the clay had been dug for manufacturing purposes. Its appearance is of interest, as furnishing another instance of the occurrence of new plants when soil that has been long buried is brought to the surface.

LIZARD ORCHIS (*Orchis hircina*).—I had sent to me last June a very fine specimen of the Lizard Orchis (*Orchis hircina*). It was found in a chalk-pit at Greenhithe. As I see from Hooker and Arnott's "British Flora," published 1850, that the plant "is very rare (perhaps now extinct)," it may be interesting to your readers to know it has been found so recently. I enclose one dried blossom that you may be sure of its authenticity. The plant was nearly 3 ft. high, the spike of blossom over 21 in. Perhaps if it has been found by any other of your readers they will let you know, as it must be a pleasure to know so handsome a plant is not yet extinct.

GEOLOGY.

A NEW GENUS OF FOSSIL CORALS.—Mr. James Thomson, F.G.S., who is well and widely known as an enthusiastic student of carboniferous corals, has just published a monogram on a new genus, which he has named *Albertia*. He also gives us, in the same elaborate paper, a short sketch by which it has been attempted to delineate the internal structure of fossil carboniferous corals during the last twenty years. Most palæontologists are aware that Mr. Thomson has succeeded in causing thin sections of coral to photograph themselves on sensitised copper-plates, so that every line is truthfully portrayed. Mr. Thomson, after a long account of failures that would have damped the ardour of a less enthusiastic geologist, relates his triumph as follows:—"It would be tedious to enumerate the various other unsuccessful attempts I made in the way of obtaining casts fitted for the accurate reproduction of structural details; but I may say, generally, that these attempts were very numerous, that they occupied a large portion of my leisure time for several years, and that they involved a very considerable amount of expense. Out of these laborious attempts, however, there finally emerged the process which I now employ, and for which I claim the merit of being applicable to the accurate delineation of the minutest details of coralline structure, and of being comparatively inexpensive. This process I have now used for two years for the production of lithographic plates, and quite recently I have succeeded in modifying it so as to produce electrotypes for use in the ordinary printing-press. Of the first form of this process, I may say that it consists in taking an impression of the structure upon a sensitised copper-plate, that this impression is then engraved upon the plate, and that a transfer is thence taken and put upon a lithographic stone. Of the second form of it, I may say that an impression is taken upon a plate of sensitised copper, that the plate is next engraved and etched very slowly, but somewhat more deeply than in the first case, that a cast in wax is taken from the plate, and that from this again is produced an electrotype in the ordinary way. The fact that the process which I have now so far described is applicable not merely to the delineation of structures presented in my own

favourite pursuits, but also to the delineation of the minute structures which present themselves to the anatomist, the physiologist, the pathologist, the botanist, and many others, is, I conceive, one of its chief merits."

LIVERPOOL GEOLOGICAL SOCIETY.—The Proceedings for 1876–77 of this well-known and vigorous society contain the annual address of the President, Mr. T. M. Reade, F.G.S., and papers on local geology as follows: "Glacial Striations at Little Crosby," by T. M. Reade; "The Conditions existing during the Glacial Period, with an Account of the Glacial Deposits in the Valley between Tranmere and Oxton," by Dr. Ricketts, F.G.S.; "The Glacial Striæ of the County around Liverpool," by G. H. Morton, F.G.S. (Hon. Sec.); "The Carboniferous Limestone and Millstone Grit of Llangollen," by G. H. Morton (*continued*); and other papers of general geological interest.

NOTES AND QUERIES.

ANIMAL VENTRILOQUISM.—Two very interesting notices of Brazilian fauna occur in Mr. Rigg-Wither's account of his work and wanderings in the forests and prairies of Parana, the one of a frog, and the other of a bird. The author does not give a description of either sufficient for determining their species, but he refers to both of them as possessing in high development the special power of ventriloquism. This is not only of much interest in itself, but as it is the first instance I have met with of any animal lower than man being gifted with this abnormal faculty, I venture to ask room for the following condensed abstracts from the "Pioneering in South Brazil," with a few observations which the narration suggests. At page 145 of vol. 1, Mr. Rigg-Wither, whilst camping out near Porta Grossa, notes that "a cry, like the moaning of a sick child, came wailing on the ear, apparently from only a few yards off; the tone, however, was too musical for a child's cry. The vocalist was a frog, and soon another from a more distant spot took up the strain, and the two sang together, now in solos, now in chorus." The author "took a torch and proceeded to the spot from whence the sound was (or seemed to be) proceeding." He "stooped to search in the grass, when the music seemed to float away to another place some yards distant, and on following it, the sound still moved, but nowhere could he discover whence it came. The fact is, this frog is recognised to be a ventriloquist of no common order"—a property the author reasonably concludes to be "given him as a protection against the numerous cranes and other frog-enemies that would otherwise be guided by the sound, and soon render the species extinct." Again, in vol. 2, page 193, a bird, notable for its shrieking voice, and known as the Bell-bird, is thus referred to: "It is seldom seen in its wild state, being, like the musical frog, a ventriloquist of very high powers, and as a sun-loving bird, a frequenter of the highest tree-tops, where its snow-white plumage and transparent wings render it almost invisible, even when in motion. In size it is but slightly bigger than a starling, with a voice powerful as a peacock's." From a description of this bird's performances in a cage, at Antonia, its notes were heard in every quarter of the town as well as beyond the outskirts, and seemed at times "to come from the mountains at the back of the town fully a quarter of a mile distant from where the bird was actually encaged." Calling to mind the peculiar cry of the Corn-crake (*Crex pratensis*), and one's similar inability to trace the varying points from which the sounds appear to proceed, I beg to add a parallel extract from an account of the habits of this eccentric vocalist of our own meadows. "The crake, crake, crake of the landrail may be heard during May and June, resounding on every side, now close at hand, as if the bird were not a yard distant, now far off; while the voices of others in different parts are unremittingly exerted. The note is the call of the male to his mate. So shy and cunning is the bird that it is seldom to be seen, and unless by means of a dog accustomed to such work, it is almost impracticable to force it to take wing. It seems to elude pursuit as if by *magic*, and is here and there threading its way through the long grass before its pursuer can imagine it has even left the spot from which its call had first resounded. Its swiftness and dexterity are indeed almost incredible." (Knight's Museum of Animated Nature.) It will be observed that no attempt is here made to account for the sudden changes of the cries heard, now near, and now far off. It is taken for granted that the crake, by some sort of *superhuman* speed of foot, can elude its pursuer as "if by magic," before it can be imagined to have left the place from which its call first resounded. The performances of a human ventriloquist afford the aptest illustration, if not a credible and rational theory, for all the conditions of the hypothesis accepted by Mr. Rigg-Wither being fulfilled by the incidents he records, and which are remarkably enforced by the manœuvres described in the last extract, of "the sly and cunning" Corn-crake. I am desirous to learn if any naturalist has noticed similar phenomena in any other bird or beast, and if so, whether the solution above indicated has been referred to, if not recognised. This marvellous faculty may possibly be a vestige of a once more extended power conferred on the animal creation, as a means of defence, by deluding and so evading their enemies. Can any of your readers assist me in these inquiries?—*A. H. B.*

PRESERVING ANIMALS.—I think Mr. Beaumont will find the most complete information in Waterton's "Wanderings in South America," published by B. Fellowes, Ludgate-street, 1852. Further useful particulars are given in his first series of Essays on Natural History, Longman, Brown, & Co., Paternoster-row, price 8/-. An abridged account appears in a small work on Taxidermy, by J. Gardner, 426, Oxford-street, price 1/6. Another account is shown in "Taxidermy," by M. Brown, Bazaar-office. If any further information is required respecting the details of the system I shall be glad to quote them from any of the works named.—*J. C. Carritt, King's Lynn.*

PRESERVING ANIMALS.—In answer to W. L. Beaumont, I beg to furnish an outline of Waterton's method of preserving animals:—"Wash the animal well in soap and water with a hard brush. Then skin the animal, taking out every bone to the last joint of the toe next the claw, and proceed to pare down from within the nose, the lips, and the soles of the feet, and sew up the mouth from the inside, beginning exactly in the front, and continuing the operation each way to the end of the gape. Now immerse the skin in a solution of corrosive sublimate in alcohol; take it out and fill it quite full of chaff, and proceed to support it on the table by introducing into the abdomen a machine made by joining two pieces of wood in the shape of a carpenter's gimlet, and of

size corresponding to the size of the animal. Let the shank of this machine hang down outside the skin, just as though it were a fifth leg in the centre of the body, and let it pass through a hole in the table, and then be fastened at sufficient height by a couple of wedges. Now touch the nose, lips, and orbits of the skin with a mixture of one part of salad oil and three parts spirits of turpentine, and repeat this touching every day till the finish. Then with a penknife cut small holes on the top of the head, behind the root of each ear, under the jaws, others on the back, and one under each foot. Now working through these holes with a piece of iron, from the size of a large darning needle to that of a ramrod, and shaped at one end like a carpenter's pricker, push out every part of the skin which ought to be pushed out, and reduce with the end of the finger any part that may be too prominent consistently with the *expression* and form which the animal exhibited during life. The lips must be reformed by means of two irons, one held in either hand, and working in opposite directions outside and inside. In due course of time, as the skin stiffens, the artist will see (as the sculptor does) the features gradually appear; and at last the skin will retain the slightest impression communicated to it by the touch of the working iron. A slit must be made in the crown of the head, or under the jaws, to allow of the artificial eyes to be fixed with a little putty or wax. Two or three weeks' practice is required in order to become an adept at this mode of preserving animals; but of course there must also exist a considerable native talent and taste for sculpture. The foregoing account is condensed (perhaps too much so) from an article on Museums in the first edition (1838) of Waterton's "Essays on Natural History." It will be observed that this process is simply one of modelling: the softened skins of animals being operated upon instead of the clay of the modeller or sculptor. Various other methods of preserving animals (especially birds) have been described in the "Philosophical Transactions" for 1770, in "The Naturalist's and Traveller's Companion," in the "Natural History of Guiana," in the Amiens Acad., vol. ii., in the "Boy's Own Magazine" for 1859, in the "Boy's Journal" for March, 1863, "The Art of Taxidermy," published by F. Warne & Co.—*P. Q. Keegan, LL.D.*

Bark Bread.—In a note to page 528 of the Flora Vectensis is the following: "Panis hic albus est *duelis* et gratissimus, præsertim recens. Usus hujus *panit* primarius et receptissimus apud," &c., &c. Linnæus says the bread is sweet and grateful, but he does not say that it is composed solely of the roots of the Calla; but he does say, "hæc farina miscetur cum farinâ" (he does not tell us in what proportion) "Cerealium vel Pini, et exinde conficitur panis secundum artem." The above quotation must have been printed incorrectly, it should be, "Panis hic est albus, et *dulcis*, et gratissimus" (this bread is white, sweet, and very palatable). "Usus hujus *panis* primaris, et receptissimus apud," &c. (This is the bread chiefly used by Norwegians and Swedes, and they like it very much.) But the flour from the roots of Calla is first mixed with rye or barley meal, and often with powdered pine bark; and of these the bread is made in the ordinary manner. We may add, the mixed bark of the pine is, even now, thus used.—*J. F. Robinson.*

Wild Animals and Man.—An interesting lecture was recently delivered at the Society of Arts, by Sir J. Taylor, on the destruction of life by wild animals in India. An extract or two may, perhaps, be of interest. In 1876, 18,273 persons were killed by wild animals; out of these, 15,946 lost their lives by snakes, 917 by tigers, 887 by wolves; the remainder being by leopards, bears, hyænas, &c. In the same year 54,430 cattle were destroyed. The number of wild animals killed during that time were 234,830, out of which snakes were 212,371. There are several ways of compassing the tiger's death. They are snared in pitfalls and traps, shot by spring guns, poisoned by strychnine, and killed by sportsmen. The natives of India, especially the Hindoos, hold the tiger, as they do the cobra, in superstitious reverence; many would not kill him even if they could, for they fear that he would haunt or do them mischief after death. In one instance in the Central Provinces a single tigress caused the desertion of thirteen villages, and 250 square miles of country were thrown out of cultivation. In 1869 one tigress killed 127 people and stopped a public road for many weeks, until finally killed. The shark is a fierce and bold creature; he dashes in amongst the crowds bathing at the ghâts, and though he seldom, if ever, under these circumstances, succeeds in carrying off his prey, yet he inflicts a dangerous, often a mortal, wound. These accidents appear to have become more common of late years, since the practice of throwing bodies into the river has been discontinued.—*H. Budge.*

"Sugaring."—In reply to your correspondent, "W. W. Walter," I used to do a little in the gentle art of sugaring, and as I was pretty successful, a few hints of mine may be of use. The best mixture to my knowledge is *Jamaica foots sugar* gently boiled in stout or porter, care being taken not to burn it. As most of the sugar known as "moist sugar" is actually refined sugar, and not the raw material at all, it is not good for the purpose. When made, a little rum may be added just before using. Several suggestions have been offered at times as to the advantage of adding oil of *anise seed*, and other oils of a similar nature, as powerful moth attractors, but I do not think they are so potent as supposed, a great deal depending on the weather chosen for a sugaring expedition, which should be a moonless night with a light south or south-west wind, a moonlight night or east or north wind being quite enough to ensure an empty bag. Although the autumn for numerous reasons is the best time for sugaring, still, there are other times of the year when lepidoptera are captured at natural or artificial sugar. In the spring the catkins of the willow or sallow are most killing traps for the Tæniocampæ, and a sheet spread under a willow in bloom will be almost sure to catch such specimens as Stabilis, Munda, Cruda, Gothica, &c., on the branches being shaken. Reverting again to sugaring, the mixture should be laid on with a brush on the lee-side of trees, about 5 feet from the ground, and I have found that exposed trees are the best, I presume from the fact of the wind carrying the scent better; where there are no trees I have succeeded with pieces of rag or fragments of bark or board, either fastened on a bush, or in want of that, a post, gate, or rock.—*Edward Lovett, Croydon.*

A Strange Place for Marsh Plants.—For a considerable time operations have been in progress for the construction of a new wet dock at Leith, and for this purpose upwards of eighty acres of a low sand-flat, known as Leith Sands, has been reclaimed from the sea. The greater part of this being within tidemark, was consequently covered and left dry alternately with every tide, and no vegetation, terrestrial or marine, was apparent. But since the reclamation wall was finished, and the salt water

excluded, along a muddy place on the sands a number of marsh plants have sprung up, and some of the species are growing in great abundance, many of them being at this date (July 1st) in full flower. I have observed the following:—*Ranunculus sceleratus, Nasturtium officinale, Stellaria uliginosa, Epilobium hirsutum, Callitriche verna, Veronica Anagallis, V. Beccabunga, Alisma Plantago, Juncus glaucus, J. lampocarpus, J. bufonius, Scirpus setaceus, Alopecurus geniculatus, and Catabrosa aquatica.* The first and last-named species are both common on the coast between Leith and Portobello, but the others appear to be new. Now the question naturally occurs, how do they happen to be springing up there? I am not aware of any satisfactory explanation that can be given, and supposition will throw no light on the subject. But as all who take an interest in the matter will have their own opinions, the following is given as a possible, if not a very feasible, one. We may suppose that a stream once entered the frith at this place, that aquatic and marsh plants grew in and around its margin, that its mouth was gradually encroached upon and covered by the sea, and the marsh plants disappeared. But their seeds remained in the sand in a state of dormant vitality, and withstood the action of salt-water and other adverse influences, perhaps for many years, till now, surrounded by conditions favourable to their development, they are again springing up into life and luxuriance.—*D. Douglas, Leith.*

A Day at Cliveden.—By the kind permission of his Grace the Duke of Westminster, I was enabled, on Saturday, July 6th last, to take my class at Westminster Hospital for a field-excursion through the above grounds. The day was, in every sense, favourable for such an excursion, and the result was well worth the journey to Taplow. We were fortunate enough in the space of three hours to collect some 119 different species, representing thirty-nine natural orders. The walk from Taplow station to Cliveden is one of the best to be found round London for its abundance of flowers of all kinds, and the gravel-pits *en route* are a storehouse of treasures to the enthusiastic botanist, who will find himself amply rewarded for any trouble taken by studies of many of our most beautiful wild-flowers, from *Verbascum Thapsus*, which grows in rare luxuriance, down to the humble *Fedia olitoria.* The Hypericaceæ are well represented, no fewer than eight species being seen, and Boraginaceæ, Dipsaceæ, Solanaceæ (including *Atropa belladonna*) and Onagraceæ form prominent features in the neighbourhood. A longer search would doubtless have only considerably raised the number of orders represented, seeing that our investigations, hurried as they were, produced the above number.—*H. W. S. Worsley-Benison.*

Curious Places for Nests.—I dare say your readers will be able to recall curious instances of the choice birds have made in selecting a place for a nest, but perhaps none more eccentric than the following. A short time back a tomtit took possession of a beehive, deserted by its proper inmates, and, having cleared out the comb, filled the circumference of the hive with wool and moss, in the centre of which it built its nest and reared its young. And a friend now sends me another curious instance. In his garden were four inverted 12-inch pots. The titmouse must have had curious stairs down to his nest, which was built on the ground in the last pot. — *George Dowker.*

Hawks in Ireland.—Can you give me any information about the various species of hawks to be found in this locality, as we have observed four distinct varieties, and have captured and trained two? The one we have at present is ruddy-brown on back and head, with black bars, tail also barred, eye black, full, and encircled with yellow band of skin, beak with tooth or notch in upper mandible, emarginated wing, with notch or sinuosity situated near the end of the quills, breast fawn-colour, with black markings perpendicularly; he has a moustache of black hairs on the cheeks, head *round* and full. The first hawk we had was quite different: he had a flattened head, with projecting ledge over the eye, which gave him quite a sinister expression; back *very* dark brown, breast white, with horizontal black bars, *very* long toes, and curved claws. Both these birds were taken from the nest and tamed. As I see natural monstrosities sometimes mentioned in your journal, I mention a deformed chicken which was hatched here and preserved by me. It has four legs, three of the legs being at *one* side, and of these three legs two have the elbow-joints *reversed* (and also the thigh-joint); there is but one thigh-joint for the two superfluous legs, the third leg at that side has a thigh-joint in the natural position; all the legs are perfect as to feet, claws, &c. This bird chipped the shell, but died in coming out. It is a Bramah.

Izaak Walton.—Perhaps some of the readers of Science-Gossip may be interested to hear that a marble bust has just been placed in St. Mary's Church, Stafford, of Izaak Walton. The ceremony of unveiling was performed by the Earl of Lichfield. The bust has inscribed upon it, "Izaak Walton, Piscator; born in the parish of Stafford, August 9th, 1593; baptized in St. Mary's Church, September 21st, 1593; buried in Winchester Cathedral, December 19th, 1683. Erected by public subscription, 1878." The bust was decorated by a Stafford lady with various water and other plants, such as the gentle old fisherman loved so well, and which still grow luxuriantly among the bright streams, so plentiful about his native town, where the author of the "Complete Angler" first imbibed his love for angling, and still greater love of nature. The poor of Stafford receive still an annual benefit from the friend whose bust they can now look at, and which will, in a measure, enable them to realize their kind benefactor. The "Complete Angler" has had its adverse critics, but Charles Lamb, in a letter to Coleridge, the poet, dated October, 1796, speaks of it in these words: "It would sweeten a man's temper at any time to read it; it would Christianize every discordant angry passion: pray make yourself master of it." The "Complete Angler" has gone through well-nigh sixty editions in this country alone.—*E. Edwards.*

Spider Instincts.—Seeing a paragraph in your September number illustrating the possession of an acute instinct in spiders encourages me to trouble you with one or two observations of a like nature that have come across my attention in watching spiders' motions. I was watching recently the completion of a web, and observing the apparent self-satisfaction with which the spider at the finish settled down, after some tightening and fortifying processes, in the centre. It seemed to me that the spider in question settled down as if in the full happiness of a domestic establishment—say, house, pictures, and so on, and the only remaining need would be the daily bread that he would require. Reflecting thus, I wondered how far he would resent any infringement or slight disturbance upon his "castle;" to ascertain which, I put a small curled-up leaf through, or partly so, one of the interstices at the lower part of the web. I was

astonished at the promptitude of Mr. Spider's observation: he was at once militant, and sallied forth, and gradually one by one appeared to unhook the web wherever it had hold of the *upper* part of the leaf, so that being thus loosed the leaf *rolled* over until again suspended at a lower level (*i.e.* just the breadth of the curl of the leaf) by the film which had fastened to the lower part originally, and which, of course, now became the top part. Quicker than the time taken to read this, the spider seemed in like manner to unfasten the newly-placed upper part, and of course the leaf rolled over again, and this method of proceeding was continued until at last the leaf was rolled beyond the limits of the web. Thus freed from such an intrusion, the spider seemed to squat down again comfortably enough in the centre. Surely, thought I, another attempt will not be cruel, and so I placed an angular bit of a leaf (about half an inch square) in the upper part of the web. Immediately my friend started forth again. Taking stock of the invading leaf, he seemed to decide that a new method of attack was necessary in this case, and so he speedily unbuckled each entangled corner of the leaf, and grasping the latter with the full expanse of all his limbs, he seemed to take it out of the mesh, and by a herculean feat to expel and throw it away outwardly from all contiguity with the web, so that it at once fell to the ground. After this, he returned to the domestic hearth in the centre. I was singularly struck by the apparent method pursued in face of these difficulties, and did not again impose upon his good nature for any further edification. On another occasion, a very large spider had spun a web across the frontage of some Virginian creeper leaves. I had no experimental intention in disturbing the "animal," and so, I forget whether I destroyed the web or merely commenced by teasing the spider. Whichever it was I however remember that he presently beat a quick retreat beneath some of the curved leaves, and from one place of refuge to another I continued to fidget him. At last—perhaps he was exhausted—he seemed to say, "I shall go no further," and the little twig (about a foot long) in my hand with which I had teased him, failed to dislodge him from his chosen refuge. He kicked out in reprisal to my annoying him, and seemed to wince, so I imagined, with great indignation. While this was going on, I happened to pull my twig of branch nearer to myself, and observed that the spider had attached a line to the end of it, and that it was continuous and unbroken. It immediately struck me to test the length to which, in the spider's wrath, I might extend the film. Steadily and carefully I carried my twig across a distance of about 9 or 10 paces of ground (about 22 feet) and fixed the free end of the twig branch into the trunk of an adjacent tree. I had therefore stretched a fine filamentous thread across a distance I never expected, and although it was so exceedingly fine and attenuated that it was only by difficulty that I could trace its course, yet it was apparently as continuous and intact as a telegraph wire. To prove this, I picked up some blades of grass, and by bending them into an angle I was enabled to *hang them upon* the spider line. At varying distances I placed a blade here and then a blade there—only, by-the-by, in *single* blades, for I was afraid of overtaxing the "line." If I remember aright, I had hung up five of these blades; but the weight of the sixth proved to be the straw which broke the camel's back—my line broke. This seemed an extraordinary case, for the spider seemed to throw out an unlimited length of "wire," and seeing I was enabled to put thereon five or six blades of grass—each blade being probably of greater weight than the whole length of film—he might perhaps have allowed me to "run out" 30 feet or more of his gossamer thread had I carried my twig that length in the first place. My last observation of spider instinct has been in the construction of the web itself, but I fear to trespass further on your space just now, however interesting and wonderful these phenomena of nature and life may be.—*J. F. S.*

ENGINEERING SKILL OF A SPIDER.—The following specimen of the engineering skill possessed by a spider may possibly interest your readers. It was discovered in an office in this town (Omagh), and was kindly shown to me by a gentleman connected with the concern. A spider, desirous of making a web, being either hard-up or taking a thoughtful view of matters, appropriated a string for an outside border, and that in a very curious manner. The string was a stout one, and hung perpendicularly from a beam. Moreover, it had a copper-wire hook attached to its end. The spider must have crept down the string, and fixed the end of one of its own lines to the eye of the copper hook, then ascended the string, carrying its own line with it, walked along the beam as far as nine inches, and then fixed the other end of its line. It must then have pulled bit by bit at the line, till it had drawn up the copper hook, and made the string describe a curve; and considering the size of the string and the size of the spider, it must have been a rather arduous task, requiring plenty of patience and perseverance. It then, by a few more lines cleverly placed, managed to relieve the strain on the main line, and complete the foundation. The web was never completed, but was left in its present unfinished condition.—*Isaac Crawford.*

CAT AND RABBIT.—When living in Essex a few years back I made the acquaintance of a splendid cat, of a glossy black from the tips of his whiskers to the end of his tail. In temper and disposition he differed from most pussies, for he was a morose old fellow, and seemed to have very little affection for anything but cat's-meat. The cry of "meat" seemed to electrify him, but after his "haporth" had been duly disposed of he would retire within himself, and take no further heed of temporal things. A more unsociable old Turk could not well be imagined. And yet—would you believe it?—this reserved old character had a soul (or its equivalent) tucked away somewhere under that black exterior, and this is what brought it out. Another member was added to the family in the shape of a glossy black and white rabbit, which in a short time was leading a very "free and easy" life on the premises. Well, between this pretty creature and the morose old "blacky" an acquaintance sprang up which by degrees ripened into a downright fancy for each other's society. Then they took to romping and playing together, and after a time the two oddly-matched animals might be seen lying on the hearthrug together, pussy's sable paws lovingly clasped round bunny's snowy neck.—*W. H. Warner.*

A MYSTERIOUS GIFT.—I beg to draw P. A. Allan's attention to the following paragraph, relating to the wonderful power of sight possessed by M. Fillifay. It is taken from a work entitled "Mauritius or the Isle of France," by the Rev. F. P. Flemyng, M.A., F.R.G.S. "It was from this station (viz. the long Mountain) that the notable M. Fillifay, some years ago, used to astonish the colonists, and indeed the world, by the singular power of sight which he possessed. His time for observation was usually at dawn, and by directing his vision to the clear unclouded sky (and not to the horizon), he could behold,

inverted (with the naked eye), any object within the singular circuit of his sight. The accuracy of his observations was verified when the British squadron was assembling at Rodrigues (an island 300 miles eastward of Mauritius), in the year 1810, for the attack upon the island. M. Fillifay stated so to the French governor, and was, it is said, imprisoned for raising false alarms. At another time he discerned what he described as two ships joined together, or, if there were such a thing, a four-masted vessel; within a few days a four-masted American schooner arrived in Port Louis harbour. He also described a large Indiaman dismasted when nearly 400 miles from the island, and afterwards announced that he could see that she was erecting jury-masts, and was steering for that port. This proved to be the case. He was a pensionnaire on the Treasury, and for years used to render 'his report' at the Port-captain's office, which was always written down by the officer as he laconically announced it: A ship, N.E. 200 miles, nearly becalmed; a schooner, W., will make the land to-morrow; two brigs standing to the southward, &c. It is a remarkable fact that, although this old man visited Bourbon, Europe, and several other places, he was unable to exercise this singular faculty of vision anywhere but at Mauritius. This, most probably, arose from the singular rarity of the atmosphere on this island, which is certainly most remarkable. He is since dead. He professed, at one period of his life, to be able to teach this mode of vision, and even obtained a fair and ambitious pupil, but he found that a Power beyond his could alone impart this wonderful gift."—*J. Henry Maughan.*

HAVE PALMS TAP-ROOTS?—As a rule the radicle of monocotyledonous seeds is little, if at all, developed; so that tap-roots are generally said not to occur in the class. A true tap-root must be the direct prolongation of the radicle. Palms seem, however, to be somewhat exceptional, to judge from the most readily accessible account of their germination, viz., that in Mr. W. B. Hemsley's papers on Garden Botany in the *Garden*, vol. xiii. (1878), p. 288 (March 30), from which I take the substance of what follows. The radicle or primary root is very often vigorous in seedlings, but it is stated that it is soon replaced by succeeding roots which appear above its apex, *i.e.* are lateral adventitious roots like those of bulbs. Whether this is invariably the case is uncertain; but the genus Borassus is a good example of this replacement. The stout tap-root of the young seedling in this genus is soon surrounded by adventitious roots, to which it surrenders its work, itself dying off. In another genus, Sabal, however, the primary root seems to be a lateral outgrowth of the embryo, the radicle apparently not being at all developed. On the whole, the preacher who said that palm-*trees* had not tap-roots was decidedly nearer the truth of the two.—*G. S. Boulger.*

HACKNEY MICROSCOPICAL AND NATURAL HISTORY SOCIETY (194, Mare-street).—The members of this society made another excursion on Saturday afternoon, the 19th October, under the presidency of one of the honorary members, Worthington Smith, Esq., F.L.S., F.R.M.S. The place of assignation was Chingford, from thence through the old forest to High Beech, returning by way of Loughton. The special objects of research were "fungi," which are found in this part of the forest in quantity and variety sufficient to repay the labours of the numerous company assembled, though comprising entomologists, microscopists, and students devoted to other branches of natural history. The weather was fine, perhaps rather too dry for the specific object in view; the forest was clothed in the varied tints of its autumnal foliage. The way being led by such an authority on "fungi" as the president for the occasion, gave to the excursion an interest and charm peculiarly enjoyable; and the instruction thus gained by an afternoon spent in the investigation of this page of nature's history will long be remembered by those who were so fortunate as to be present. No fewer than thirty-six species of fungi were collected and identified.

WHAT WAS THE "FAGUS" OF THE LATINS?—Was the Rev. J. Mitford (formerly editor of the *Gentleman's Magazine*) right when he asserted that "fagus" must mean the sweet chestnut? because Cæsar says the Britons had not the fagus. Landing in Kent or Sussex, Cæsar must have seen the beeches, which love a chalky subsoil. The "*Spanish chestnut*," as it is often called, is no doubt an importation from abroad.—*W. H. Freeman, Reepham, Norwich.*

LAPWING AND HAWK.—Some five years ago Mr. G. R. Bull, of Stafford (who related to me the incident), was driving out one morning, a few miles from Stafford, with, I believe, Dr. Day, when they suddenly heard a confused rustling noise overhead, and something then plumped down into the ditch by the roadside. On alighting they found a hawk and lapwing in deadly embrace, the hawk's talons embedded in the lapwing's breast, the bird just expiring; the hawk already dead, from the beak of the lapwing being fixed in the eye and brain of his enemy. As the latter had made his fatal pounce, the intended victim had made one supreme effort, and by a lucky peck in the one vulnerable spot, avenged his own death.—*Alf. Freer.*

ORNITHOLOGICAL INSTRUMENTS.—Where can scissors for cutting the bones of the embryo in birds' eggs, described in Prof. Newton's "Suggestions for forming Collections of Birds' Eggs," be procured? also German-silver blowpipes?—*Beta.*

ARGE GALATEA.—Could any of your correspondents inform me as to whether *Arge Galatea* has ever been noticed near Bedford before? I took a rather fine specimen at the close of August this year.—*W. E. Fairbridge, Bedford.*

"BOB-OWLERS."—It may interest those of your readers who care to note the local names of plants, insects, &c., to know that in Staffordshire the thick-bodied moths are called "Bob-owlers."—*K. D., Almondsbury.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

W. T. HORN.—Thanks for the specimen of *Helichrysum*, which, unfortunately, was jumbled into an indistinguishable mass when it reached us. Get Burbidge's "Cool Orchids and How to Grow Them," with plates, published by Hardwicke & Bogue, 192, Piccadilly, price 6s. It is the best work of the kind we know.

A YOUNG BEGINNER.—Mr. Collins has recently issued what he calls a "Histological Microscope," at £5. 10s., which would answer all your requirements. It is a marvel of mechanical skill, and can be easily stowed away. It is sufficient for all the requirements of a natural history student.

W. H. JONES.—The spikes of *Plantago* are the largest we have seen.

E. E. EVANS.—For details concerning the construction of an Egg Cabinet see "Notes on Collecting and Preserving Natural History Objects," price 3s. 6d., published by Hardwicke & Bogue.

K. D. (Almondsbury).—*Orbitolina* is a genus of *foraminiferæ*.

G. O. HOWELL.—The calyx segment of the Bud of Fuchsia you enclosed has reverted to the condition of a true leaf.

H. F. RASELL.—Get "Half-Hours with the Microscope," by Dr. Lankester, with chapter on the "Polarisation of Light," by F. Kitton, published at 4s. by Hardwicke & Bogue, 192, Piccadilly, London.

A. SMITH.—Get Cooke's "Microscopic Fungi," (illustrated) price 6s. London: Hardwicke & Bogue, 192, Piccadilly.

K. D.—Bentham's "Handbook of the British Flora," published by L Reeve & Co.; and the Second Edition of "Hooker's Student's Flora of Great Britain," just out, published by Macmillan.

R. RATTRAY.—Many thanks for your excellently mounted slide of *Licmophora flabellata*.

M. SHAW.—Accept our thanks for seedlings of the Date Palm.

W. H. SHRUBSOLE.—"Banded-flints" were originally formed by the filling-up of cavities in nodules, layer by layer. Subsequently the nodules have been broken up, and the harder banded parts liberated, and rolled into the shapes and appearance in which you see them. (2). The boring appears to have been made by some other mollusc than *Teredo*. (3). No doubt the concretionary nodules, and the appearances you describe, are due to the soft, decomposing, organic matter of the animals whose hard parts usually form the nuclei, having caused chemical segregation.

To QUERISTS.—We are obliged to postpone the publication of several answers until our next, on account of want of space.

EXCHANGES.

IN exchange for a few Microscopical Slides, a Flying Fish 8½ inches in length, from Pacific Ocean.—W. E. Barker, Jesus College, Cambridge.

IN exchange, a Centipede (in spirits) from Honolulu.—W. E. Barker, Jesus College, Cambridge, for Microscopical Slides.

WANTED, Perfect Specimens of *Æcidiacei*, unmounted. Several species of *Puccinia*, *Uromyces*, &c. offered.—E. W. Halway, Decora, Iowa, U.S.A.

A NATURALIST having a large collection of British and Foreign Birds' Skins at his disposal would be glad to hear from any gentleman requiring the same, either in lots or singly, in exchange for other Skins.—W. Barrett Roué, 165, White Ladies'-road, Bristol.

SEVERAL splendid Slides of Algæ for well-mounted Parasites, also British Butterflies, and some Birds' Eggs, including gold crest, black-cap, great tit, redstart, and several others, about twenty-five in all. Desiderata, Birds' Skins, particularly hawk, owl, or woodpecker tribe, or swallows and British Lepidoptera, not in collection.—W. Barrett Roué, 165, White Ladies'-road, Bristol.

WANTED, Devonian Rocks and Fossils, in exchange for specimens from other formations.—Thomas D. Russell, 48, Essex-street, Strand, W.C.

WANTED, *P. machaon*, *G. rhamni*, *C. Hyale*, *C. edusa*, *A. cratægi*, *A. Galathea*, in exchange for British Birds' Eggs, blown with one hole.—T. V. Devey, Woodland, Cockfield, Darlington.

CORNISH Rocks and Minerals, Diallage, Serpentine, Steatite, Mica Schist, Luxuhganite, Schorlite, Schorl, &c., in exchange for Scientific Books, Fossils, Rock specimens, and Minerals.—J. S. Ilsley, 6, Trevethen-terrace, Falmouth, Cornwall.

Erythræa latifolia (vera) and 460½ for the following, exclusively, 101*b*, 153 var.?, 158*b*, 202*c*, 215, 461*b*, 536, 544 to 546, 691*b*, 708, 721, 861*b*, 874*b*, 934, 970*b*, 1212, 1219*c*, 1223, 1228, 1238, 1262, 1266, 1267, 1282*c*, 1298, 1453, 1457, 1476*b*, 1554, 1624.—J. Harbord Lewis, 145, Windsor-street, Liverpool.

1,000 polished specimens of Madrepores, Minerals, Fossils, British Shells, in exchange for foreign Shells, good Ferns from coal measures, or good Silurian Fossils. Will also send good polish slabs of Madrepore for slabs of the Bristol or Clifton Landscape Stone, or a box of rough Madrepores for a box of good and well-marked rough Landscape Stone.—A. J. R. Sclater, Naturalist, 9, Bank-street, Teignmouth, Devonshire.

FOR a pair of Fedonia Conspicuata (frosted yellow), send a good slide of clean Diatoms or Anatomic human, for half an ounce of foreign sand, containing foraminifera, specular talc, &c.—Send slides as above.—E. Eaton, 48, Currier's-lane, Ipswich.

I AM collecting various Specimens of Pond Life, and shall be glad to exchange for unmounted or mounted microscopic objects or accessories. Wanted particularly, unmounted anatomical sections, either stained or injected.—C. W. Lawton, 5, Montpelier Vale, Blackheath, S.E.

WANTED, Diatoms and Desmids, good slides of material, in exchange for other slides or rare British Plants, L. C. Nos. 104, 146, 184, 176, 253, 368, 527, 556, 611, 704, 767, 769, 831, 858, 913, 929, 975, 999, 1001, 1130, 1218, 1293, 1519, and many other lists exchanged.—J. Tempère, 12, Cecil-street, Moss-side, Manchester.

Licmophora flabellata, growing on algæ, stained and mounted in balsam, for good samples of Marine Diatomaceous Earths.—R. Rattray, 30, Balfour-street, Dundee.

SPECIMENS of the new mineral Hullite, described at last meeting of British Association, also Trachyte, Chalcedony, &c., from the basalt of county Antrim, in exchange for Lias, or Cretaceous Fossils, or recent British Shells.—William Gault, 68, Christopher-street, Belfast.

OFFERED Nos. 111, 140, 155*b*, 169, 184, 203, 315, 326, 354, 355, 363, 587, 622, 812, 813, 1128, 1264, 1281, 1290, 1297, 1584, 1586, *Trifolium stellatum*, and many others, for rare or local British plants.—J. H. A. Jenner, 4, East-street, Lewes.

VOLUME of "Palæontographical Society" for 1878. What offers? Wanted. sixth edition, "Chaffers on China."—James Griffin, 3, South Bar, Banbury.

WANTED, to purchase Smith's "British Diatomaceæ" and Pritchard's "Infusoria." A good price will be given.—Apply to J. F., 11, Truro Vean-terrace, Truro.

WANTED, 78*a.b.c*, 106, 108, 119, 175, 202, 367*b*, 467, 477, 637, 701, 737, 747*b*, 819, 828, 839, 945, 1020, 1082, 1095*b*, 1255, 1484, 1507, 1631, &c., in exchange for rare plants.—G. C. Druce, Northampton.

WANTED, all kinds of unmounted Microscopical Material, in exchange for other specimens.—Alpha, 16, Brunswick-street, Poplar, E.

FOR exchange, a quantity of well-mounted histological specimens (duplicates).—C. James, 19, Vincent-terrace, Islington, N.

FOR injected Human Kidney, stained Human Intestine, *Gomphonema geminatum*, wing of Brazilian Butterfly, scale of Pollack, and Japanese grass (polariscope). Send any well-mounted Balsam Slide to J. A. Kay, Mansion-house, Brompton, Chatham.

OFFERED:—A small collection of American Birds' Skins. Wanted:—Fossil fish remains or offers.—T. Stock, 16, Colville-place, Edinburgh.

AMERICAN, Bermudas, European, British Eggs. side blown; many rarities, Eleonora falcon, Rufus swallow, Wall creeper, Phæton flavirostus (tropic bird), Rock thrush, Turdus cyaneus (Eastern thrush), Alpine chough, &c., in exchange for others.—Sissons, Shanon, Sheffield.

RARE BRITISH VERTIGOS.—Correct and well-authenticated specimens of Vertigos, *Antivertigo pusilla*, *minutissima*, *Alpestris*, *substriata*, and *angustior*, offered in exchange for really good and choice Foreign Shells, land preferred to marine; also offered, *Lim. involuta*, *Succinea oblonga*, *Unio margaritifera*, *valvata*, *cristata*, *Balæa fragilis*, *Clausilia rugosa*, var., *Schlechtii*. Wanted, *Pupa ringens*, *Achatina acicula*, *Conovulus bidentatus*, var., *albus*, *Testacella haliotoidea*, *Lim. Burnetti*, and *Acme lineata*.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

WANTED, Microscopic Fungi, mounted; will exchange Crystals or other objects for the same.—A. Smith, Essex-road, London.

WANTED, Microscopic Fungi, unmounted; other Fungi will be sent in exchange.—A. Smith, Essex-road, London.

SHELLS, *Carychium minimum*, &c., for other good land, fresh water, or marine Shells, or offers.—Mrs. Skilton, London-road, Brentford, Middlesex.

BOOKS, &c., RECEIVED.

"The Geology of Ireland." By G. H. Kinahan. London C. Kegan Paul.

"The Beginning." By H. P. Malet. London: Trübner & Co. "Abstracts of the Proceedings of the Liverpool Geological Society" (from the commencement in 1859).

"American Naturalist."

"American Journal of Microscopy."

Potter's "American Monthly."

"Boston Journal of Chemistry."

"Botanische Zeitung."

"Chambers's Journal."

"Ben Bratley's Journal."

"Land and Water."

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 8TH ULT. FROM:—E. W. H.—E. W. B.—C. C.—J. M. S.—W. H. J.—C. P.—F. K.—W. L. B.—W. C. T.—W. E. F.—E. E. E.—W. L. S.—K. A. D.—W. J. H.—J. O. B.—C. W.—C. F.—W. S. W.—W. E. G.—S. M.—C. W. C.—A. J. R. S.—W. L.—J. W. S.—J. M. W. A. H.—H. J.—W. H. F.—T. M. R.—A. F.—T. V. D.—W. B. R.—R. A. R.—H. B.—J. H. L.—M. H. R.—J. D. R.—T. E. L.—M. K.—A. T.—W. G.—A. H. H.—J. H. A. J.—J. D.—C. W. L.—A. W.—H. M.—R. R.—M. V.—W. W.—J. T.—T. W.—F. J. F.—W. M. B.—H. P. M.—T. L.—C. T. B.—J. N. D.—A. W.—J. G.—J. B.—W. J. M.—M. S.—C. A. J.—R. H. M.—J. M. M.—J. F.—A. S.—J. D. O. G. C. D.—W. S.—M. E. M. H.—W. B.—J. W. S.—T. S.—J. A. K.—&c. &c.

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HARDWICKE'S

SCIENCE-GOSSIP:

1879.

HARDWICKE'S

Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY

J. E. TAYLOR, PH.D., F.L.S., F.G.S., F.R.G.S.I., &c.

VOLUME XV.

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PREFACE.

FIFTEEN years is a long period in the life of a man, and a relatively longer one in the existence of a magazine. It is time enough to have given a fair trial to any scheme, or to have proved a *raison d'être* for any institution. We are reminded of this in prefacing a few lines to the Fifteenth Volume of SCIENCE-GOSSIP. And it is with no small pleasure, as we take a mental review of our situation, that we find ourselves surrounded with more numerous friends, and even abler contributors than ever.

The domain of Natural Science extends in widening circles every year. New and more complex organic relationships are discovered the more we look for them. We bear the highest of unconscious testimony to the Supreme Intelligence which governs the universe, when we require the facts of Science to be subordinated to intelligible laws; and there is a higher mental pleasure in finding out the laws which govern these facts, than in discovering the facts themselves. But as the circle of the Known increases in its circumference, we perceive the larger periphery of the Unknown which circumscribes it. Within this infinitely little circle, there is light as in the land of Goshen, but outside, darkness like that of Egypt! The attitude of the scientific mind, therefore, ought more than ever to be the reverse of dictatorial.

During the past year we have opened our columns to the discussion of one of the most interesting of the many biological side-paths

which modern investigation has opened out, the question of "Intelligence in Man and Animals." We have been pleased with the ability with which the subject has been discussed from the evolutional, as well as the anti-evolutional sides, and not less so with the good temper and courtesy displayed by the partisans. Twenty years ago this mutual forbearance would have been impossible, and a discussion like this would have broken up into personal recriminations. We must now, however, close the debate.

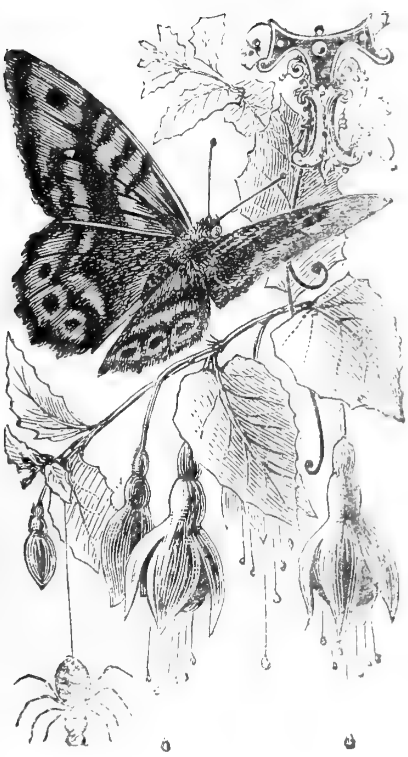
The crowded state of our "Exchange" columns shows how zealously amateurs are working in their special departments of natural history; and the various and oftentimes queer questions put to us in the columns devoted to that purpose, indicate the number of recruits who are joining the ranks. We hope that the "List of Naturalists" which appears in the present number will prove of great practical advantage to young and ardent workers.

We look forward to a more active year than ever. Our editorial box is well filled with articles—technical, descriptive, and popular, on every branch of Natural Science. We shall do our best to make the volume for 1880 more attractive in every way than any of its predecessors. And, whilst thanking our numerous, zealous, and hearty friends for the many kindnesses we have received at their hands, we wish to all our contributors and subscribers, "A HAPPY NEW YEAR!"

LIST OF ILLUSTRATIONS.

THE CAPPED CUMULUS, OR ARCHED CROWN.

BY THE REV. S. BARBER, F.M.S.



THIS phenomenon, which is not very unusual in thundery weather, when the storm is gathering or passing away, is interesting as being indicative of the extent to which the electrical masses affect the contiguous atmosphere. When highly charged piles of cumulus are seen drifting in the breeze, at no great distance, and exhibiting rifts and chasms and mountain crags about their precipitous sides and sunny peaks,—wreaths of mist and vapoury bands may be seen floating athwart the dark sides and rolling upwards toward their summits. This foggy vapour holds off from the rock-like sides of the towering cumulus (with which it refuses to coalesce), and gives to the latter an appearance of great solidity. Often maintaining its isolation, it spreads over the topmost crests in a thin, loose strip of vapour, and, bending down the opposite side of the cloud, forms a complete *detached* arch. At times this arch has the appearance of being highly condensed; and, allowing for the height of the species of cumulus to which it attaches itself, the intervening space of clear sky between the two clouds must often be of considerable dimensions.

There can be little doubt that the cap or arch formed in this way has a form which corresponds to that of the larger cloud. At times, however, the appearance may be one of perspective only, as may be seen when there are short strips or thin lines of condensed stratus lying among the cumulus. These, particularly in unsettled weather, have their ends sometimes *bent downwards*, as if attracted by the earth.* In passing, we may say that this latter form of cloud (which is closely allied to the cumulus-"cap") is seen generally before rain storms, and often precedes violent squalls. It is seen occasionally in parallel bands.

Whether the form of the vapour which crowns the summit of a cloud-pile results from the radiation of electrical force acting at a certain distance, or is merely the effect of condensation caused by the chilling effect of the cloud mass on the surrounding air, is an interesting though a difficult matter to determine; the relations existing between different masses of cloud not having yet much engaged the attention of meteorologists. Even when these masses are similar in species there is much difficulty; but the difficulty is greater when those species are different, *e.g.*, those of stratus and cumulus, as in our present subject.

It has been remarked by Maury and other writers, that the sudden formation of hail or snow must often be attended by a noticeable increase in the temperature of the surrounding atmosphere, and the fact has been so recorded. This increase of temperature is in agreement with, and indeed corroborates, the mechanical theory of heat so fully enunciated by Tyndall in his interesting work on "Heat as a Mode of Motion." The part which electricity plays in regard to the origin of the stifling and oppressive† atmosphere that precedes thunderstorms must be very powerful, whether acting directly or indirectly.

It has been noticed that the passage of a large bank of cirro-cumulus will often cause a remarkable dropping of the temperature of the air beneath; and (allowing this to be true) we can only account for the

* Probably it is merely a more condensed variety of that which forms our present subject.

† There can be little doubt, however, that the sensations many persons experience before a storm result from the direct action of the electricity in the body.

fact by supposing that the particles of the cloud are in the transition state—changing rapidly from the condition of half-frozen water into the vaporous state of cumulus or nimbus. We say *half* frozen, for the cirro-cumulus scarcely ever exhibits, like the various forms of cirrus, prismatic effects, which it undoubtedly would do if it were composed of fully formed ice-crystals. If then, we allow the accuracy of the observations recorded, as to the chilling effect of this cloud on the atmosphere beneath, we may also be justified in inferring that, for the most part, it is *a transition cloud between cirrus* (the proper ice-cloud) *and some other more watery species, e.g.*, cumulus or stratus, rather than an intermediate stage between these and the cirrus itself.

(*To be continued.*)

A RAMBLE ON THE KENTISH HILLS.

I THOUGHT that an account of some of the spring plants to be found on the hills near Otford and Kemsing might be interesting to the readers of SCIENCE-GOSSIP who had never botanised in this locality. My first intention was to call this article "A Walk on the Chalk," but thinking the title might mislead, I changed it—"A Walk on the Chalk" generally being considered in London "a milk walk!"

Three of us started from Otford platform—it can scarcely bear the dignified title of station—at about eleven o'clock in the morning, walked through the village, admired the old castle (where, by the bye, a blacksmith has erected a smithy), and then through a gate, over a ploughed field, up the hill; what with the hill and the field, it rather tired us, it being extremely warm. Halfway up, on a grassy bank, we espied *Ophrys muscifera* and *Aceras anthropophora;* a little higher up two or three clumps of *Cynoglossum officinale;* on the brow, under the trees, we passed *Daphne Laureola* and *Atropa Belladonna*, both in profusion; then we caught sight of a fine spike of *Orchis fusca*, which amply repaid our blow up the hill. A short distance on we found *Neottia Nidus-Avis*, its brown stalk and flowers exactly matching the colour of the ground. Down the hill again more *fusca*, then a large specimen of *Habenaria chlorantha*, measuring about 28 inches in height, and a quantity of *Habenaria bifolia* a little farther on. Out of the wood, and on to a grassy knoll, where we had a fine view of Kent stretching for miles and fading away into the Sussex hills. Just a bit of lunch; then we turned into a copse on our right; here we found *Cephalanthera grandiflora* in full bloom and plenty of it; out again, down a disused chalk-pit; here growing were *Helianthemum vulgare, Hippocrepis comosa, Pyrus aria, Viburnum Lantana*, and a few stray specimens of *Aceras anthropophora.* Left here and walked down to the small village of Kemsing, noticed the quaint old church, which has lancet-shaped windows, and, if report says true, is built on an old Roman temple; next came to St. Edith's Well, which originated, not from the chalk hills, as we profane moderns think, but from St. Thomas à Becket's staff; he, good man, travelling by the pilgrims' way, feeling thirsty, stopped at Kemsing and struck his staff into the ground, from whence, we are told, gushed the water. After taking a good draught from it, and gathering some of the *Asplenium Ruta-muraria*, which grows on the wall built round, we set out on the dusty road. Before we got far, one of my friends drew my attention to the curious laciniated variety of Elder (*Sambucus nigra laciniata*) growing in the hedge; further on we came to a specimen or two of *Lathræa squamaria*, which the road-man had tried hard to destroy by throwing a heap of stones on it; but no, he had left three untouched, all with seeds; one we gathered, and left two. Turned back a little way, and down a lane past an old farmhouse, where we found on a wall *Ceterach officinarum*—this, by the way, a rarity in Kent. We must scarcely mention a closer description of the locality than this, or the herb collectors would be after them, but enough to say, if any botanist *searches* for it, he will be rewarded. Over a field, and narrowly escaping wet feet by plumping into a boggy ditch, out into a pretty country lane; we walked down here for about half a mile, and then came to the (L. C. & D.) railway bridge, under which we pass, and into the meadow on the left-hand side; here we gathered *Orchis mascula, latifolia*, and *Morio*, also *Valeriana dioica* by the side of the ditch. Out into the road, and a little higher up we found a beautifully variegated variety of *Sambucus nigra*, all the veins being surrounded with a broad cream-colour border.

Up the short but steepish hill, the road delightfully overshadowed with the green foliage, and relieved here and there by a bit of blue sky; then on to the Chart (Seal); here *Juniperus communis* is very common; among the fir-trees we found *Convallaria majalis* flowering very sparingly; this, I believe, is the characteristic of the uncultivated plant *Lomaria spicant*, of course growing abundantly here.

On looking at the time, we find it to be five o'clock. And now we are close to Ightham; here I part with my friends and make my way through Inghatch (here by the roadside is a clump of *Lamium maculatum*), and on to Plaxtol, but go a bit out of my way to the copse at the bottom of Sheet Hill, where *Paris quadrifolia* and *Ophioglossum vulgatum* grow, the first-named plant being rather a local one in Kent. Gathering a specimen or two of each, I walk on to Plaxtol, and thence home, after having spent a most enjoyable day.

Hadlow. F. W. E. S.

ON MOUNTING MICRO-FUNGI.

As the seasons of the year revolve in rapid succession, each, and all, bring with them their own particular work and studies for the microscopist. When, as Horace puts it, "*Solvitur acris hiems gratâ vice veris et Favoni*," the ardent microscopist begins to prepare for his early campaign, over hill, through dale, and in the woodlands; again, when summer bursts upon him with all her warmth and beauty, he plunges deeper than ever in scientific research for objects dear to his own particular branch of study; autumn, too, finds him busily engaged wandering through fields lit up with the brilliance of the golden grain soon to be ingathered. At last comes winter, "clothed all in frieze," this is without doubt the season of all others when study and manipulation of his objects collected in the bright seasons are brought more particularly into play. Within his study, with his microscope and objects at hand, cheered by the friendly blaze and warmth of his own fireside, he feels that the dull dark months, as some consider them, are to him anything but dark and dreary. To such a time we have once more come, and to each and all it has brought its delightful work. My own particular study throughout this year has been the micro-fungi, those minute organisms which live on other plants. It is my intention therefore in this short paper to put before my readers, as briefly and as concisely as possible, a few brief hints, culled from my own experience, as to the best and the easiest way of mounting those micro-fungi for which we have made so diligent a search throughout the spring, summer, and autumn months, with, let us hope, plenty of success. I do not intend to enter into the minutiæ of collecting the fungi and classing them. To those who at present have not taken to this most interesting branch of microscopical research, let me recommend a book which will give them all the knowledge on the head of collecting and classing they will require; I mean "Rust, Smut, Mildew, and Mould," by Dr. M. C. Cooke, a book to whose value and excellence all who, like myself, have used it and (let us hope) profited by it will, I feel sure, bear witness.

The mounting of micro-fungi is very simple, and may be classed under two heads :—

1st. Those specimens which may be mounted dry.

2ndly. Those which require some medium in which to be preserved.

And, firstly, of the apparatus required for dry mounting :—

1. Plenty of glass slips with ground edges.*
2. Thin glass circles of various sizes.
3. Three or four dozen vulcanite balls.
4. Sharp fine scissors (a pair).
5. Bottle of white-lead varnish.
6. Turn-table and camel's-hair brushes.

All these things being at hand, we may proceed to manipulate our fungi. Of course, the great Order from which so many dry mounts are taken are the Æcidiacei; we will suppose that we are about to mount a specimen of *Æ. Tussilaginis*. First, take the leaf on which the specimen is located, and with the fine scissors cut round the cluster-cup, leaving sufficient leaf to fill up the vulcanite cell. Having taken care that the specimen lies perfectly flat in the field, place a ring of white varnish round the top of the cell, and on this lay the thin glass cover. After allowing time for the varnish to dry, run two or more rings round, and neatly, as a finish, one of green in the centre of the white varnish. The slide having been duly labelled is then fit to place in your cabinet. Nothing is easier than this method, yet, like everything else, the novice may fail in his attempts to succeed, and after mounting a specimen Æcidium in the way above described, he will perhaps in a day or two be surprised to find he is unable to distinctly see his object through a dimness which appears to have come over the thin glass. This is caused by the object not having been properly dried. *Great* care should be taken that all specimens are *thoroughly* dried before mounting.

We now turn to the method of mounting in fluid, which is by no means so easy or so certain of producing good results. The apparatus and fluid required may be briefly named as follows :—

1. Ground-edge slips.
2. Thin circles.
3. Fine knife.
4. Spirit-lamp.
5. Glycerine jelly (the best).
6. Gold size.
7. White-lead varnish and brushes.

In this case we will take as our example for mounting a specimen of *Aregma bulbosum*, of the order Puccinia. Having seen that your slide is well cleaned, take the leaf with the *A. bulbosum* on it, and with the fine knife scrape on to the slide sufficient spores to fill the field of view without crowding it. Next take up some glycerine (which has been placed in a cup of very hot water in order to liquefy) in a dipping-tube, and gently let fall one drop on to the spores, then hold the slide over the spirit-lamp in order that all shall be warm, then *very gently* place the thin glass cover over the medium, and put the slide aside till cold. When the glycerine has well set, take a knife with slightly warmed blade and scrape all the superfluous glycerine from the outside of the thin glass cover; next run three rings of gold size round, allowing each to thoroughly dry before the next is laid on; after this has been done, finish with white and green varnish as in dry mounting. In this method the difficulty will be how to obviate air bubbles; these in working with glycerine are its great drawback. I

* Ground edge slips, though more expensive, are the cheaper in the long-run, as they are neater and of smaller compass.

am rarely, however, troubled with them, and I owe my success, I consider, to seeing that the glycerine is thoroughly liquid and warm, and that the thin covering glass is laid down on the spores and fluid in the *most* gentle manner. Be careful in mounting with glycerine what varnish you use, as there is scarcely one that is not affected by this fluid. After many trials and many failures with others, I have come to the conclusion that there is nothing equal to gold size.

Thus then have I very briefly endeavoured to point out the easiest and quickest way of mounting micro-fungi. In conclusion, let me add a word about the labelling of your specimens. Be *very careful* always to roughly note on each slide at the time of mounting the name of the specimen, for it is of little use, in the case of those fungi the spores of which are mounted in fluid, trying to remember the name some day or two after mounting, many spores being so much alike that the thing is almost impossible. Before placing in the cabinet, neat labels, such as may be bought at any optician's, should be placed on the slide one at each end, bearing the Order and Latin name of the fungus, with date of mounting and mounter's name. It is as well also to add the English name. As an example of what I mean, see fig. 1. I must, before finishing, give one warning, and that is, Be *very* sure that you get the *best* glycerine jelly, viz. that which is as clear as crystal. There is some sold which looks foggy and muddy, so to speak. This, when viewed under the microscope, shows an amount of deposit of some kind, which, with such minute organisms as those of which I have been treating and with a high power, prove ruination. The clearest glycerine jelly I ever remember to have used I procured of Mr. Dunscombe, optician, of St. Augustine's Parade, Bristol. It was put up in a test tube, which was fitted into a case; this doubtless could be obtained at any optician's, and is without doubt the best glycerine for mounting micro-fungi I ever met with. I trust that, this winter, many who have not yet turned their attention to micro-fungi mounting may at last be persuaded to do so, and I can promise them that the result will fully repay their labour.

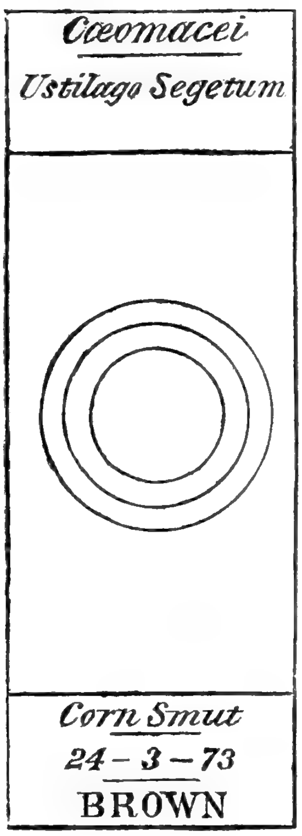


Fig. 1.—Example to show mode of labelling micro-fungi slides, and also of applying rings of coloured varnish.

CHARLES F. W. T. WILLIAMS.

ANOTHER FUNGUS RAMBLE IN EPPING FOREST.

LENZITES BETULINA occurs on the roots and stumps of old trees: it has the habit of a Polypore; corky, coriaceous; straight gills, somewhat branched when young, torn when old; pileus tomentose:

Dædalea quercina and *D. unicolor*. The former is

Fig. 2.—Tomentose pileus of *Lenzites betulina*.

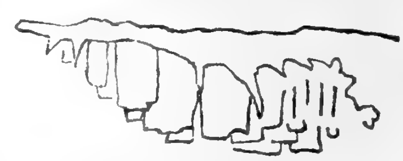


Fig. 3.—Lamellæ (old).

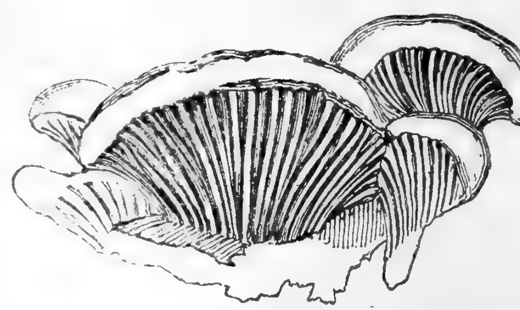


Fig. 4.—Lamellæ in the young state.

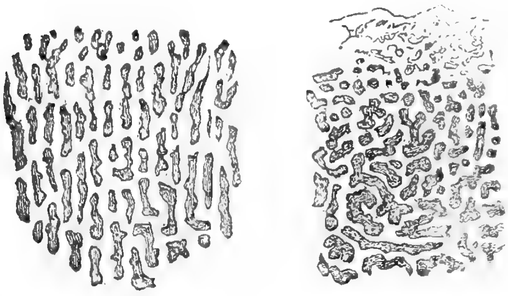
Figs. 5 and 6.—Lamellæ straight-branched and anastomosing of *Dædalea quercina* (young state).

nearest Lenzites, the latter, of more frequent occurrence, approaches Polyporus: both are similar in habit to this genus. The pileus of *D. quercina* is of a pale buff-colour, with concentric lines not unlike *Polyporus ulmarius*.

D. unicolor has a coriaceous, corky pileus, villoso-strigose, cinereous, with zones of the same colour: The sinuses of both species are torn and labyrinthiform when old; similar in this respect to Lenzites.

The polypores are plentifully represented, both as

Boletus and Polyporus proper. The scientific distinction between the two is that in the former genus the hymenium of the cells is separable from one another and from the hymenophorum, which is not the case in the latter. Generally speaking, the polypores have a coriaceous, corky or even woody structure, while that of the Boleti is soft and spongy; but there are intermediate forms: *P. spumeus*, for instance, which we gathered from the dead trunk of a tree, is somewhat spongy. The polypores are usually stemless, with lateral attachments to their matrices; the Boleti have stipes like an agaric; but *P. rufescens*, of which we found one specimen near the "King's Oak," is furnished with a central stipe: it is the prettiest of its tribe, the pileus is red and polished, especially on the broad border; hymenium white. *P. lucidus* (two specimens) is also a handsome fungus; it grows laterally from the roots of old trees; the pileus is of a dark reddish-bay (not unlike old red morocco), and polished; hymenium whitish.



Figs. 7 and 8.—Labyrinthiform pores of *Dædalea unicolor* (young state).

Figs. 9 and 10.—Hymenium of *Polyporus versicolor* (young state).

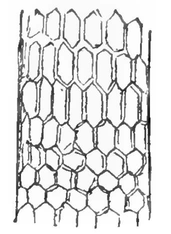
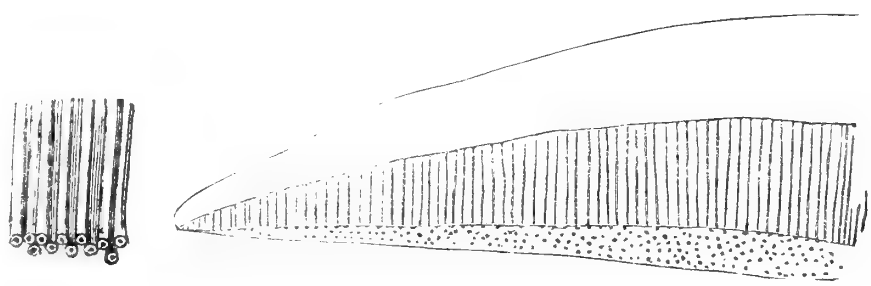


Fig. 11.—Reticulated stem of *Boletus edulis*.

Fig. 12.—Section showing the villose strigose pileus of *Dædalea unicolor*, and pores torn and toothed when old.



Figs. 13 and 14.—*Fistulina hepatica* with pores (enlarged in 13).

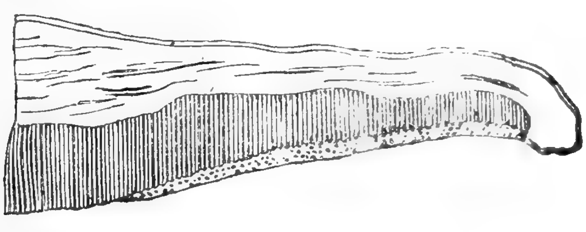


Fig. 15.—Section of *Polyporus lucidus*, showing the tubular hymenium.

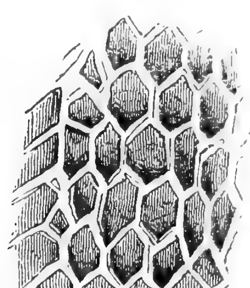


Fig. 16.—Large angular pores of *Boletus flavus*.

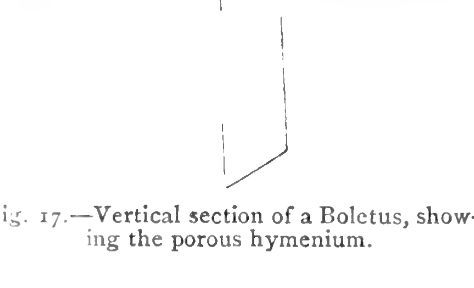


Fig. 17.—Vertical section of a Boletus, showing the porous hymenium.

The polypores are arranged in divisions, according as the stem is central, lateral, or wanting; besides these there are resupinate forms.

Of the stemless kinds, *P. versicolor* met the eye upon almost every other old tree-stump; rather handsome in the young state, before the rich velvety-brown tomentum of the pileus with its broad border of light drab variegated with zones of the same hue has faded; the hymenium is white, and pores so small as to be scarcely perceptible to the naked eye. More general and protean in its forms is *Polyporus vulgaris*, a white, corky, closely adherent, resupinate species, with a most repulsive and sickening odour: on trees, sticks, stumps, everywhere; frequent and also resupinate, but not adherent, *P. ferruginosus*: pileus with hardly any substance, thin, and coriaceous; hymenium irregular; pores unequal; of variable habit, but usually growing laterally from old stumps. *P. tomentarius* was also observed on old trees.

Of Boleti we gathered specimens of six species.

These are in habit like Agarics (see figure). Most frequent, *B. chrysenteron;* brown and tomentose above, greenish-yellow below: *B. æstivalis;* pileus dark brown, cracked when old, dirty white beneath: and *B. scaber;* much resembling it, but stipe covered with fibrous scales (both species in the wood behind Loughton). *B. edulis*, one small specimen, brownish above, whitish below (when young, but when old turning to a pale yellowish-green), the tubes elongated and half free; it may be known from its congeners by its stem, which is elegantly reticulated. *B. flavus*; pileus viscid, yellowish; hymeneal surface yellow; pores large, angular, ragged; stem cribrose above with the decurrent tubes; not frequent. *B. elegans;* hymeneal surface lemon-yellow; of firmer substance than the preceding, and with much smaller pores; one specimen; copse below Woodford.

Plentiful this year was another plant of the Polypore family, of a soft, spongy, or fleshy consistence: viz. *Fistulina hepatica*, growing upon old oak-trees. Those who are unacquainted with its peculiar aspect could hardly credit its strong resemblance to a piece of raw bullock's liver, and still less imagine that so odd-looking and unattractive a thing can be edible. We had a portion of it dressed for dinner; the odour and flavour thereof were not bad, but it ate very much like what stewed gutta percha might do, and there was an after sensation upon the teeth and palate of astringency, referable no doubt to the presence of gallic acid. From a scientific point of view it is an interesting fungus, because different to other Polypores in that the hymenium is at first papillose, but when full grown the tubes are seen to be all separate and distinct.

(*To be continued.*)

CHEMICAL ACTION IN ITS GEOLOGICAL ASPECT.

By T. Mellard Reade, C.E., F.G.S., &c.

EVERY ONE is, no doubt, familiar with the fact that, in boiling most water in our common kettles, a white precipitate, known as "fur," forms on the inside of the vessel. This is specially the case with our well water, and is due to the fact that the water, in its passage through the pores of the rock, has dissolved and taken up, in solution, lime, in the form of a carbonate, which is precipitated in the process of boiling. This is not only the case with well water, but, to a greater or less extent, with river water, the relative amounts being due to the nature of the rock forming the drainage basin of the river. We are thus brought face to face with the fact that all natural water contains, however clear it may seem, extraneous minerals in solution, for not only do we find lime in it, both in the form of a carbonate and a sulphate, but also *magnesia*, *silica*, *potash*, *soda*, *iron*, and other minerals, in more or less minute proportions.

This may seem a very small matter, and a very weak instance of "chemical action," but these very forces, apparently so insignificant, have been mainly instrumental in fashioning this world of ours into its pleasing alternations of mountain and valley, hill and dale. But to make the importance of the fact plain, it is necessary to put some figures that will give an idea of the gross, as well as relative, quantity of minerals removed in solution by water. It is possible, you may think, that 19 grains per gallon of "solids in solution" is so small as to be unworthy of notice, but as regards the river Thames it means, according to Professor Prestwich's calculation, the removal into the sea annually of 548,230 tons of saline matter, or, roughly speaking, a ton a minute.

We thus see that all rivers are carriers of invisible material, and that, in addition to the mud, sand, and gravel which, the most unobservant person can see, is hurried along to the sea at every freshet, a slow and silent transference of materials is taking place with great uniformity of action, winter and summer, dry weather and wet, from the land seawards. The Rhine, the Rhone, and the Danube unitedly, according to calculations I have made, remove annually in solution over thirty-six million tons of saline matter.

By an elaborate calculation, but a thoroughly reliable one, I have arrived at the result that the rainfall removes, in England and Wales, matter in solution equal to 1 foot in thickness over the whole area (in round numbers) in thirteen thousand years.* But these effects of chemical action mean much more, geologically, than at first sight appears, for the removal of so much mineral matter in solution is, in most cases, the destruction of the cementing materials that hold the more insoluble particles of the rocks together, and their consequent degradation. It is as if the mortar of this building were dissolved out by chemical action, and the loose bricks, stone, and timber carried away by the first floods into the river Mersey. Therefore it is clear that, in order to account for geological changes of magnitude, we only require time and large areas of land for the rain to act upon.

The effects of chemical action on rocks is often apparent in an objectionable and costly manner in the stone used for building purposes. The decomposition and crumbling away of the new red sandstone of which Chester Cathedral was built is an instance, and in the Shrewsbury churches the decay is very apparent. The same may be said of the Permian sandstone, of which a church in Coventry is composed, while in Ludlow parish church the same action may be seen on the old red sandstone. The decay of these stratified rocks is largely due to their numerous planes of bedding and porous nature, permitting the penetration of water. Solid granite, however, not possessing any stratification, weathers and decays in

* Geological time. Presidential Address, Liverpool Geological Society, session 1876–77.

some cases, such as the granite used for building purposes about Dublin, the decomposition being very rapid. The decay appears to me to be due to the state of agglomeration of the grains of which it is composed, in addition to the chemical nature of its constituent minerals. Solid granite rocks decay *in situ* to the depth of many feet, and the resultant of the decomposition is, in Cornwall, kaolin or china clay. In the boulder clay about Liverpool, we find many decayed boulders of granite and greenstone, in some cases the core being preserved, and ringing like metal under the hammer, while the surface exfoliates and falls to powder. Limestone appears to be beautifully preserved in the clay, but exposed to the atmosphere it is dissolved away. These specimens show, in the case of limestone, the most delicate striations preserved, in the case of greenstone only a resultant powder.

If from such small examples we extend our views to natural scenery, we find that its character has been largely determined by chemical action. The valleys and dells of Derbyshire, so admired for their beauty, the gorge of the Chee Tor, the cliffs of Cheddar, in Somersetshire, all result from the dissolution of limestone by the chemical action of rain, but by far the most remarkable features of limestone districts are the caverns with which they abound. The Peak Cavern, Kent's Hole, Wokey Hole, the Mammoth Cave of Kentucky, are all produced by the continued action of water percolating from the surface through joints and fissures, removing the lime in solution, and enlarging, slowly but surely, its channels until large caverns are produced, sometimes underground rivers, and, finally, as the roof falls in, valleys.

Having just returned from a visit to the Burren, a remarkable limestone district in county Clare, by Galway Bay, I was much struck with the effect of chemical action on the scenery. There you have grand limestone mountains, rising terrace above terrace, in many places entirely bare of verdure, in others covered with grass, of the hue which gives the name of the "Emerald Isle" to Ireland, while a closer inspection shows most of the terraces and the sides of the mountains to be split up with joints in all stages of enlargement by rain wash, the upper surfaces often bare; in others with basin-shaped hollows holding water like a saucer, in which a fresh-water Alga grows. In others the joints may be overgrown with moss and verdure, giving a treacherous appearance of solidity—places to be avoided at the risk of a sprained ankle or broken leg—but by far the most curious thing is to see, perhaps 18 inches down at the bottom of the crevices, the surface rocks being bare, ferns growing in the greatest luxuriance. My friend, Dr. King, of Galway, pointed out to me that the decay of the Alga formed a very fine soil which washed into these crevices, forming a fitting support to the Maidenhair fern. The Alpine plant, *Dryas octopetala*, also grows in great luxuriance, and is the relict of a former Arctic climate. In other places, where the rock is not "jointed," Dr. King informs me, there exist plains of bare limestone. Not a stream of water is to be seen in all this remarkable district, but many springs, which the inhabitants hold in superstitious reverence, and call "holy wells," sometimes forming very picturesque subjects for sketching; of this character is the one at Glen Inah, near Ballyvaughan. This continual solvent action on the rocks from the joints frequently quarries out large blocks of limestone, proving, I have no doubt, of great advantage to the builders of those remarkable structures called "Round Towers," the objects of so much controversy and little knowledge, of which the use has never been discovered, nor the date of their building fixed.

Lochs Mask and Corrib are both basins in the mountain limestone of Connemara. They communicate only by an underground river. To show the necessity of a knowledge of geology to the engineer, I may mention that during the famine an attempt was made to cut a canal to connect the two lakes for navigation purposes. The cut was made, but when the water was turned in, so fractured and fissured were the bottom and sides that the canal would not hold water, and it remains to this day a monument of misdirected energy.

To treat fully of the connection between scenery and chemical action would take up more space than I have at my disposal, but I trust in this short outline I have given an insight into the forces which produce natural beauties that charm the eye, or grander ones that awe the mind. The forces of the storm-tossed sea, the hurricane, the earthquake, and volcano, may seem much more potent and terrible, but the ever evenly enduring wear of the elements through chemical action produces in the end results quite as great, nay, greater, though it is so distributed and slow as to be unappreciable to the eye except in its effects after long lapses of time.

ON THE DEVELOPMENT OF THE HOUSE-FLY AND ITS PARASITE.

THE following remarks on the development of the house-fly are such as have come under actual observation, and the appended sketches were made by Mr. G. Harkus from the microscope, with the aid of a Beales reflector.

Mr. Harkus, with whom I experimented simultaneously, was fortunate, or the reverse, in having the required ova brought to him in this way. A fly having gained access to a cold joint of lamb considerately left a sufficient supply for his examination. The objectionable part of the arrangement was probably counterbalanced by his being enabled to fix the time of deposition with tolerable certainty. This was on July 28. The eggs (one of which is represented

in fig. 20, its diameter $\frac{1}{30}$ inch) were placed with a portion of the meat in a glass vessel, and next day the maggots had emerged as in fig. 21 (diameter $\frac{1}{25}$ inch), where the ramifications of the tracheal system may be traced.

The warm weather, coupled with the indoor heat, matured the larva rapidly, the change from maggot to chrysalis (fig. 19) being apparent at each observation, some having assumed this state on July 30. The perfect stage was reached and the fly emerged on August 5, or eight days from the deposition of the ova (fig. 18).

This was a week in advance of the result obtained in my experiment, which I preferred to conduct out

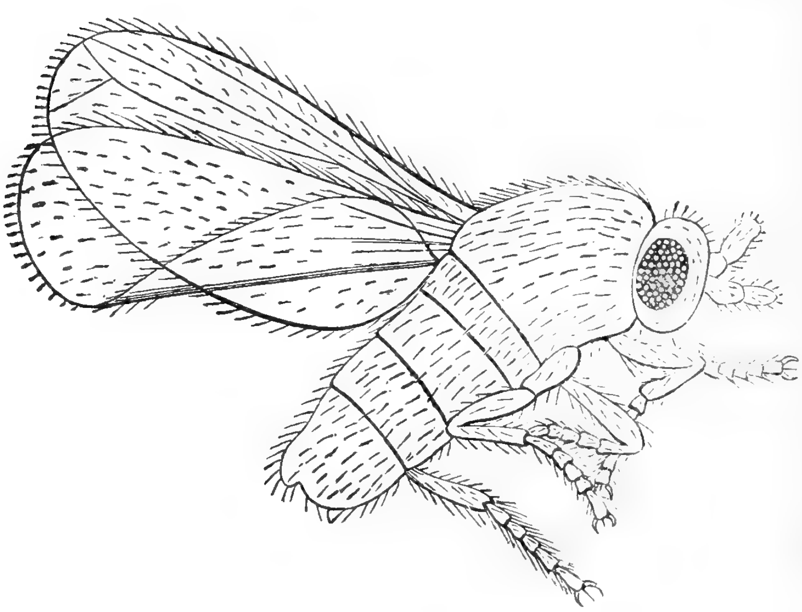


Fig. 18.—The House-fly (*Musca domestica*), magnified.

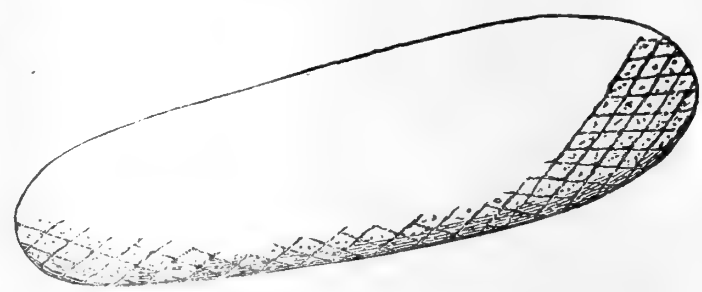


Fig. 20.—Egg of House-fly, July 28, 1878, × 30.

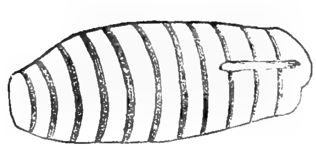


Fig. 19.—Chrysalis of House-fly, July 20, 1878, × 40.

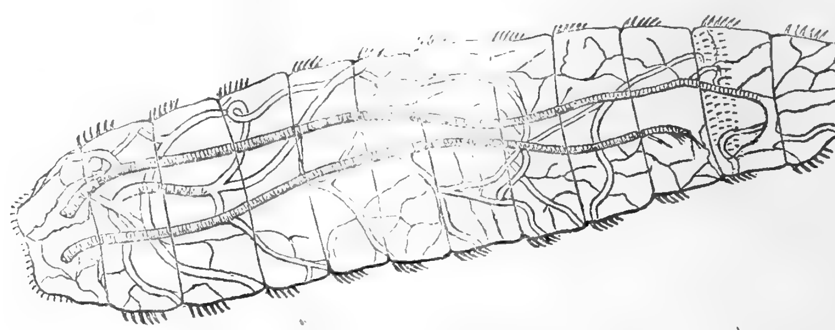


Fig. 21.—Maggot of House-fly, July 29, 1878, × 25.

of doors. A piece of raw liver was exposed, which soon had eggs enough attached to it. It would appear that the fly has to some extent the power of withholding the deposition of her ova until a suitable medium is found for the requirements of the larva.

In two or three days the maggots were at work; their activity and voracity in devouring the putrescent mass of animal matter gave it the appearance of fermentation.

For observation in the live box, any little weakness connected with the somewhat objectionable odour arising from the garbage had to be got rid of and some few maggots washed clean. Neither immersion in water nor yet compression seemed to inconvenience them appreciably; their leathery integument is not easily ruptured, and is sufficiently translucent to render the trachea, as well as the undulatory vermicular movement of the internal organs, apparent throughout under a low power; in fact, from its toughness, transparency, and strength, the larva is an excellent object for microscopic examination. When the animal matter was devoured, the maggots moved restlessly about, changing in colour from yellowish-white to brownish-red; the cuticle became dense and opaque; motion gradually ceased, until the perfect insect emerged by forcing of the segments of the anterior end of the shell, occupying from fourteen to fifteen days in completing its series of life changes.

Mr. Harkus's part of the experiment appears to be useful so far as to show the adaptability of the fly and its ova to circumstances, and that the larva assumes the chrysalid state when its supply of food becomes exhausted, although otherwise immature (in this case the animal matter given them would dry up), instead of dying from starvation.

The chrysalis and fly in his examples are undersized and impoverished, compared to those permitted to feed in a semi-fluid mass of animal matter.

In autumn the house-fly seems specially the victim to the attacks of a parasitic fungus (*Empusa Muscæ*), and may be seen glued, as it were, to walls, a white powdery growth appearing at the segments of its body (the spores of the fungus). This vegetable pest is similar to, if not identical with, the parasite which causes so much destruction amongst fish in aquariums, and last year even attacked salmon in some English rivers.

The cause of the fly becoming so firmly attached to dry surfaces is this. The two pulvilli which, with two strong curved claws (perhaps best seen with the flesh-fly, *Musca vomitoria*, as a subject), terminate the foot are surrounded by a fringe of tubular hairs, each ending with a disc or sucker, through which a glutinous fluid exudes. These form the points of attachment, enabling

the insect to walk in any position, the action of the two claws detaching these points as the fly moves along.

When the ravages of the parasite have sufficiently weakened the fly by the destruction of its viscera, &c., it becomes incapable of active movement, and, remaining too long in a place, the viscid fluid continues to exude, and then the fly "sticks to the wall."

M. H. ROBSON.

A RARE SPECIES OF HEMIPTERA.

THE following species of Hemiptera being, I believe, an undescribed one, the account of it may not be uninteresting to your readers.

It was discovered in some water percolating through

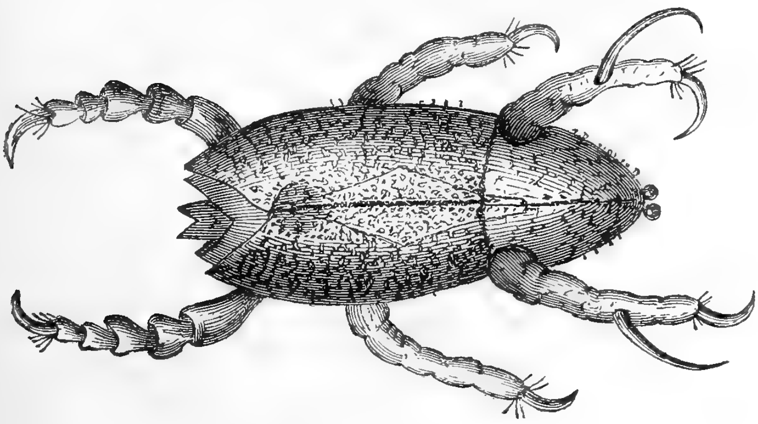


Fig. 22.—Dorsal aspect of sp. of Hemiptera.

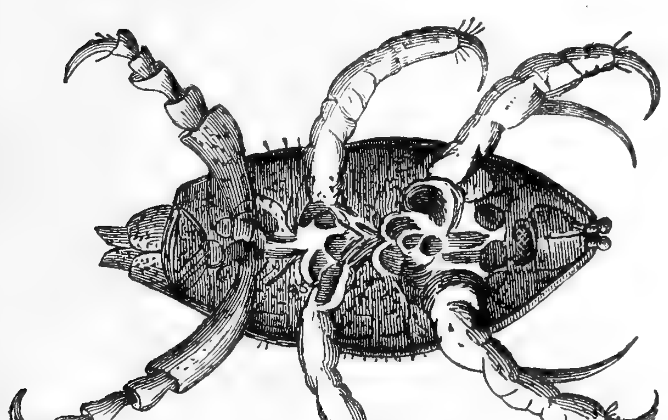


Fig. 23.—Ventral aspect of Hemiptera.

a crevice in an old wall, in conjunction with the *Oscillatoria decorticans*. Fig. 22 will give a general idea of the dorsal aspect of the insect. The rostrum was rather blunt, and at the apex were two small globose suckers, containing a viscid matter of great reflecting power. Eyes not apparent. The head was joined throughout its whole width with the thorax, with the exception of a small semicircular space on either side; from these spaces sprang the wing cases, which stamps it as an individual of an Order of the Hemiptera.

The sheath was closely covered with helical or screw-like markings, which could only be brought out distinctly with a high power, and forms a beautiful object for the microscope. The first pair of legs were devoid of any transverse segmentations, the most singular feature being a long horny spine half the length of the leg, and curved towards the tarsus. I have not observed these appendages before on any insect. The foot was beset with seven or eight fine hairs terminating in a claw, which was continued into an unusually long and fine point. The middle legs resembled the pair last described, except that the long bristles were absent. The hind pair of legs were placed low down the meta-thorax, and were composed of five distinctly marked segments, the femur being about twice as long as the remainder of the leg. The tarsus gradually tapered, and ended in a single claw surmounted by hairs, the long spine being absent. The ventral view, fig. 23, shows the abdomen with its eight segments tapering to the anal region. The whole of the underside of the beetle was covered with very fine hairs.

Although I had the insect under observation for some hours in an excavated slide, I did not once see it use its wings or rise to the surface of the water as if for the purpose of breathing.

Its colour was a dark brown.

The elytra were a pale yellow, the markings being the same colour, but much more dense.

They resembled the wing case of the boatfly (*Notonecta*).

Size of the object about $\frac{1}{50}$ inch.

JOHN DAVIS.

A GLANCE AT THE SCIENTIFIC WORLD OF FIFTY YEARS AGO.

HAVING had lately to consult the volumes of the "Philosophical Magazine" for 1829–30, I have been much interested by the view of contemporary science which they afford. The volumes record the death of four great lights of science, two of chemistry, Sir Humphry Davy, Dr. Wollaston, and two of astronomy, Dr. Young and the Marquis de la Place. They contain the last papers written by the two first named: that by Sir H. Davy on the electricity of the torpedo; that by Dr. Wollaston on a method of rendering platina malleable. The advance which knowledge has made since that date is of course especially perceptible in geology. The writers of papers on that science seem mostly to look upon the literal accuracy of the Mosaic account of the creation and the Noachian deluge as an axiomatic truth to which the facts observed have to be made to fit. One writer repudiates the idea of mineral veins having their origin in fissures of the rock, and adopts an explanation similar to that of the Cromarty quarryman, who told Hugh Miller that, when God made the rocks, he made the fossils in them. Even geologists so philosophical as De la Bèche, Conybeare, and Lonsdale, stoutly maintain that the appearances presented by the rocks, and the physical configuration of

the surface cannot be explained by any forces now known to be in operation on the earth's surface, and call in the aid of "débâcles" (a word now as obsolete as the view which it embodies), or huge gushes of water, set in motion by the convulsions which produced the dislocations of the earth's crust known as faults. The difficulties which prevented the acceptance of the uniformitarian theory seem to be, first, an inadequate conception of the extent of past time (we find it maintained that valleys could not have been carved out by the erosive power of streams, since we find ancient British and Roman fortifications attesting by their perfect preservation that the form of the surface has remained unaltered since the time of their construction fifteen centuries ago); and, secondly, the phenomena then known as "diluvial." The glacial theory had not then arisen to throw a flood of light upon the origin of such phenomena as perched blocks and transported boulders, carried far from their native mountains, yet lying in the midst of fine clay.

In natural history we find the natural system beginning to make headway against the overwhelming authority of Linnæus, an authority which it was looked upon as something little short of blasphemy to gainsay. We have heard of an entomologist who went through his cabinet and destroyed every specimen which he could not find described by Linnæus. So the medieval physicians declared that they would rather do wrong with Galen than do right with any one else. A Mr. Roscoe, who speaks in a tone of authority, declares that, whatever may be the merits of Jussieu as a botanist, it is sufficiently clear that they are not exemplified in the superiority of his arrangement as a nomenclature for the vegetable kingdom. "We are compelled to conclude that as a nomenclature and series of plants it is greatly inferior to that of Linnæus; and that however excellent it may be in some respects, it will never supplant in general use that long established work."

Another system which has not been equally fortunate in standing the test of time is the dichotomous system of the Rev. Dr. Fleming. A paper entitled "The Dying Struggle of the Dichotomous System" contains a criticism of that system, or rather of its author, in comparison with which the debate chronicled in the first chapter of the transactions of the Pickwick Club is amenity itself. The opening sentences will give a fair idea of its tone:—"Some years have now elapsed since a gentleman, the sable hue of whose vesture, if not the smile on his countenance, betokened that he should be at peace with all men, came up from the North to London, and announced himself to me as the Rev. John Fleming, D.D., minister of Flisk, N.B. I knew him at the time only by two or three articles in the supplement to the "Encyclopædia Britannica," which, if they be not fair specimens of a Scotch D.D.'s usual quantum of Greek, will at least remain a monument of his talent for writing on animals that he not only never saw, but would not even now know if he saw them. In addition to these truly novel specimens of entomological knowledge, I knew him also by a subsequent compilation called with much modesty 'The Philosophy of Zoology,' the first volume of which contains nothing new but some miserable plates, and the second little original except some names which have been framed in a proper independent spirit and with a noble contempt of Priscian. Thus we have *Trochusidæ*, *Gordiusidæ*, *Ciciudeladæ*, cum multis aliis in *dæ* of similar calibre. Having *two* D's tacked to the end of his own name, the worthy minister doubtless thinks that he has a right to clap *one* to the tail of anything." The following example is given of the dichotomous system:—

Man
- 1 Scotch
  - 1 Breeched
    - 1 Dominies
      - 1 Of Flisk
        - 1 D.D.
          - 1 Fleming
            - 1 John.
            - 2 Not John.
          - 2 Not Fleming
        - 2 Not D.D.
      - 2 Not of Flisk.
    - 2 Not Dominies.
  - 2 Not Breeched.
- 2 Not Scotch.

The author of this satire is W. S. MacLeay. When Scot meets Scot then comes the tug of war. However, time brings its revenges, and if the worthy D.D.'s dichotomous system has failed to obtain recognition, his assailant's own pet "quinary system" has followed, or perhaps preceded, it into the limbo of exploded vanities. We may congratulate ourselves that scientific discussions are not now conducted in such a tone. Very different in style are some pleasantly written papers by Professor Schultes of Landshut, Bavaria, "On the Cultivation of Botany in England." The professor, in visiting England, was struck with the deep, full verdure of English vegetation. He had often heard and passed censures on the intense colours of the figures in English botany, but now perceived that the complaint was unfounded, the prevailing hue of vegetation being even of a deeper tone than there represented. He observed nothing in the flora of the roadsides which struck him as being different from that of Germany except *Ulex europæus* and "a species of *Rubus*, which, though called by all the botanists of this country *R. fruticosus*, is not the plant which bears that name on the continent, of which the corollas are always pale red." What a charming picture of simplicity! the critical botanists or "splitters" had not yet tried their hands upon this prickly genus.

The professor is justly indignant because Sir J. E. Smith, the president of the Linnean Society, and the most eminent botanist in England, was formally inhibited by the vice-chancellor of the university from delivering lectures on botany at Cambridge, because

he was a Dissenter. However, the university of Cambridge is not alone in not always acting in a spirit of wisdom: for the university of Landshut falls in for censure in that, while it spends 6000 florins on its beer cellar, it allows its botanic garden to fall into decay. Kew Gardens, in pre-Hookerian times, did not impress our author favourably, but he was highly delighted with those of the Horticultural Society at Turnham Green, being apparently captivated by the delicious flavour of the peaches and pine-apples grown there. The British Museum of those days, the present building being then only just commenced, he considered a disgrace to an enlightened people. He notes the fondness of the English for flowers: "The poor Londoner, who cannot afford to buy what is beautiful, will still, if possible, obtain something green to decorate the window with of his dark little attic, and give his last farthing for a bit of verdure." He is severe on the fiscal arrangements of those days, especially the window-tax and the duty on imported books. His herbarium being contained in some musty old volumes on law and divinity, he was charged thirty florins duty on them, to escape which he had to take out his specimens one by one and place them in papers bought for the purpose, and abandon his old folios to the Custom House officials. He visited Oxford, performing the journey in six hours, though at the risk of breaking his neck. He speaks with warm admiration of English botanists, especially of Mr. Don, whose reputation does not now stand so high as it then apparently did.

A curious example of the change which men's ideas have undergone in another department of human interest is afforded by a description of a "Parabolic Sounding Board" erected in Attercliffe Church by the Rev. J. Blackburn, minister of Attercliffe cum Darnall. The woodcut with which the paper is adorned shows a lofty pulpit of the "three-decker" pattern, surmounted by a huge erection like a dimidiated umbrella. This sounding-board was constructed on mathematical principles, and it was claimed that, if the preacher's mouth was exactly in the focus of the parabolic surface, an attentive hearer would perceive an effect that might be compared to the gentle swell of an organ.

We find various things now familiar to us announced as novelties. We are told where "those curious substances bromine and bromide of potassium, which we believe have not been hitherto prepared in this country," may be obtained. Iodine has also the interest of novelty. There is a paper, now historic, by Dr. Robert Brown, "On the Movements of Active Molecules"; and we may read the speech of the President of the Royal Society on delivering a medal to Mr. Charles Bell for his discoveries of the functions of sensory and motor nerves, in which he says: "Of all the branches of human knowledge, anatomy has experienced the greatest difficulties in struggling against passions, prejudices, and superstitions." We may congratulate ourselves that the difficulties alluded to were in great measure removed a year or two later by the passing of the Anatomy Act; but the prejudice against the study of anatomy is not even yet extinct; and has it not been left to our present parliament to prohibit in effect physiological research in the land of Harvey, Hunter, and Bell, at the instance of an ignorant and sentimental clamour, based upon the groundless statements of disingenuous agitators?

The perusal of these volumes shows us how great the advance of science has been during half a century, both as regards the number of ascertained facts and the theories which connect them together and give life to the dry bones. It is not, however, for us to be puffed up with our knowledge; if we know more than our fathers, it is because we have inherited the fruits of their labours; and who can tell how much that which passes current with us to-day may have to be modified or set aside before another half-century has passed? We see how time tries scientific as all other work: if a theory be false, neither the prestige of a great name nor the sanction of authority can prop it from falling; if it be true, neither denunciation nor even ridicule can prevent it from becoming ultimately accepted.

H. F. PARSONS.

THE GEOLOGY OF IRELAND.*

ALTHOUGH less known to English geologists than any other part of the British Islands, the geology of the "Sister Isle" is, perhaps, for many reasons, the most interesting and instructive. Representatives of the most important formations are here found developed after a manner different to what they are seen elsewhere. There is "eozoonal" structure in the pure marbles of Connemara; characteristic zoophytes (Oldhamia) in the Cambrian slates of Bray Head and the Wexford Mountains; peculiar Silurian fossils, as well as rocks, in the iron-bound coasts of the west; a wealth of Devonian ferns and cryptogamia in the fine sandstones of Kilkenny, such as no other member of this ancient formation has yet yielded; carboniferous rocks which, in addition to the characteristic forms found elsewhere, have a fauna of their own—strange-looking fishes, amphibians, and labyrinthodonts. The carboniferous limestone stretches over the greater part of midland Ireland. Then we have triassic, Rhætic, and a little oolite, succeeded by chalk, miocene shales, and relics of volcanoes and volcanic lava flows; drift beds even more distracting in the numerous forms they assume than their representatives in England or Scotland;

* "Manual of the Geology of Ireland." By G. Henry Kinahan, M.R.I.A., &c., of H.M. Geological Survey. London, C. Kegan Paul & Co.

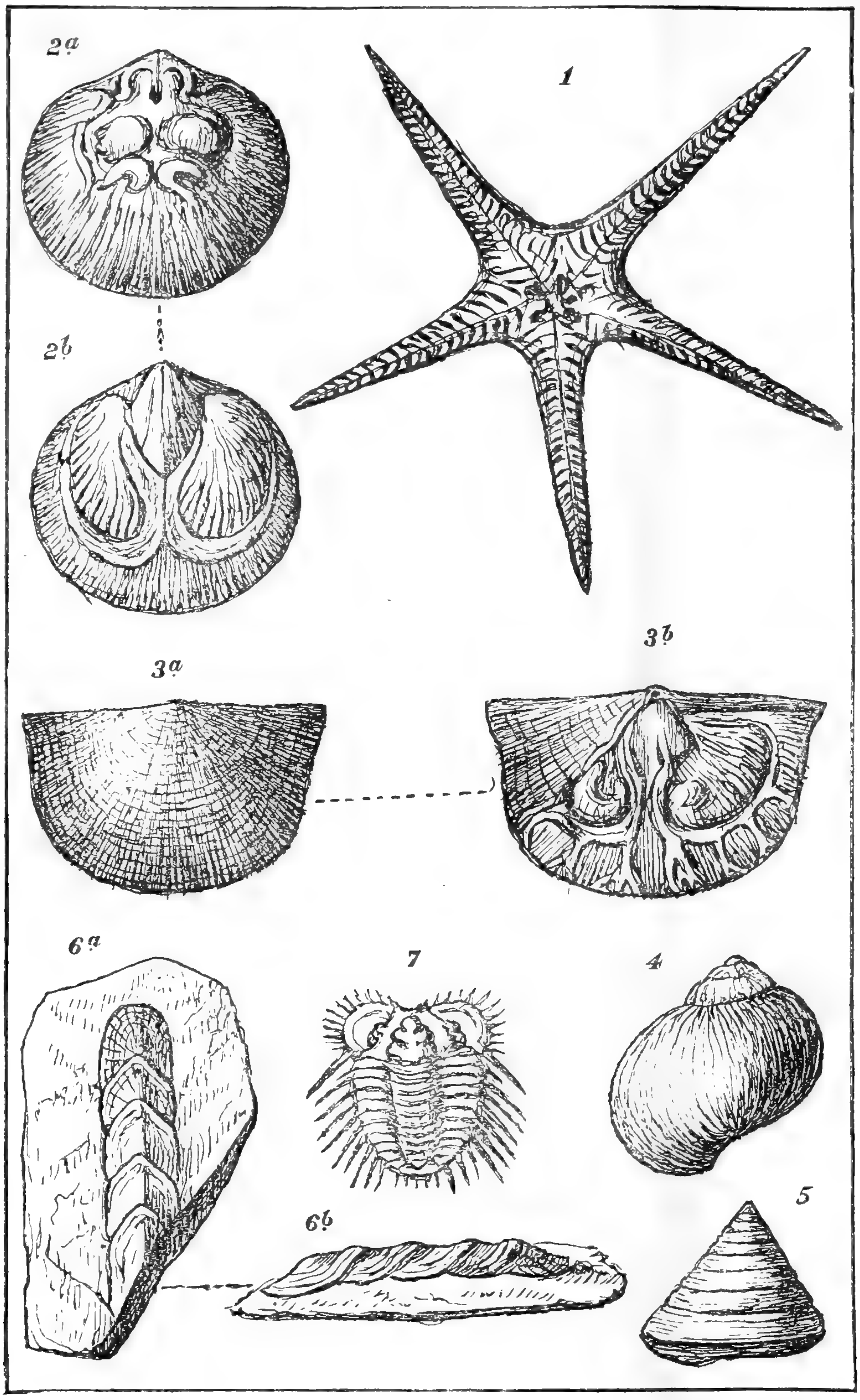


Fig. 24.—Cambro-Silurian and Silurian Fossils. From Kinahan's "Geology of Ireland," Plate II.

post-glacial peat-bogs, turbaries, relics of ancient man and ancient art—surely in this short summary of rocks of every geological age and mineralogical character we have the secret of that picturesque and scenic natural beauty which the "Green Island" possesses more than any other in the northern hemisphere.

Mr. Kinahan's "Manual of Irish Geology" is a most useful addition to our scientific literature. No other geologist was so competent to the task, for Mr. Kinahan has been engaged on the Irish Survey for many years, and now occupies the honourable position of senior geologist. He has in person examined, worked out, mapped, and surveyed the most difficult and important parts of the geology of Ireland. He has long been recognised as a keen observer of physical geology, and the book before us is filled with the results of a life's hard work. The Geology of Ireland, physical and stratigraphical, is treated in the methodical detail which is most valuable to a student. We might take exception to some of Mr. Kinahan's conclusions as to the evidences of *marine* denudation he freely quotes, for in many respects the author is antagonistic to the "subaerialists" in geology who at present have the explanations all their own way. And we think it would have been better if the old instead of the *new* technical terms had been adopted.

The book is divided into five sections, each containing several chapters. These sections are devoted severally to "Sedimentary Rocks," "Metamorphic and Eruptive Rocks," "Superficial Accumulations," "Physical Features," and "Economical Products." It is illustrated by many woodcuts, the sketches of which are original, and some very good; and also by eight plates of fossils, &c., of whose merit the reader can best judge by the two which, through the kindness of the publishers, we are enabled to lay before them. The style in which the book is written is well suited to the subject, being matter-of-fact and clear. Mr. Kinahan, with Irish generosity, adopts the commendable practice of giving to all those geologists who have in any way helped him, or whose works are quoted, the fullest credit they deserve.

This "Manual" will henceforth be necessary to the student of the geology of the British Islands, and particularly that of Ireland. It is in every sense of the word most creditable to its author, and we hope it will bring him the scientific honours he so well deserves.

MICROSCOPY.

"The Germ Theory of Infectious Diseases."—This is the title of the address delivered by Dr. Drysdale, as president of the Liverpool Literary and Philosophical Society. It is a pamphlet of 74 pages, published by Baillière, Tindall, & Cox. We know of no other similar paper which is so clear and comprehensive, so original and logical. It is not only a capital summary of all that has been said and written and experimented on this most important subject, but it lays down the basis of new experiments, with a view to determining the simpler and less complex theories.

A NEW LAMP FOR MICROSCOPIC MOUNTING.—In mounting balsam slides, I find that a small benzoline lamp with opaque white glass answers admirably in the place of the spirit lamp and brass plate advocated by so many writers on microscopic mounting. The slide may be laid flat across the lamp-glass, and the heat can be regulated to any degree by means of the rackwork. The light which this lamp gives enables the worker to detect any moderate-sized air-bubbles, while the opaque lamp-glass prevents the light dazzling his eyes. The cost of this lamp is only 1s. 6d., and it may be bought of almost any oilman.—*Geo. Clinch, West Wickham, Kent.*

SECTION CUTTING.—Messrs. J. & A. Churchill have just published a neat little manual by Dr. Sylvester Marsh, entitled "Section Cutting: a Practical Guide to the Preparation and Mounting of Sections for the Microscope." Special prominence is given to the subject of animal sections. It is a most useful little book, and cheap, the price being, we believe, half-a-crown.

THE QUEKETT MICROSCOPICAL CLUB.—No. 38 of the "Journal" of this popular and useful club has just been published, containing papers as follows:—"On an Apparatus for Use with Powell's Small Bull's-eye Illuminator," by Geo. Williams; "On the Influence of Diffraction in Microscopic Vision," by F. Crisp, LL.B.; and the address of the late president (Henry Lee, F.L.S.). Prof. Huxley has been elected president for the ensuing year.

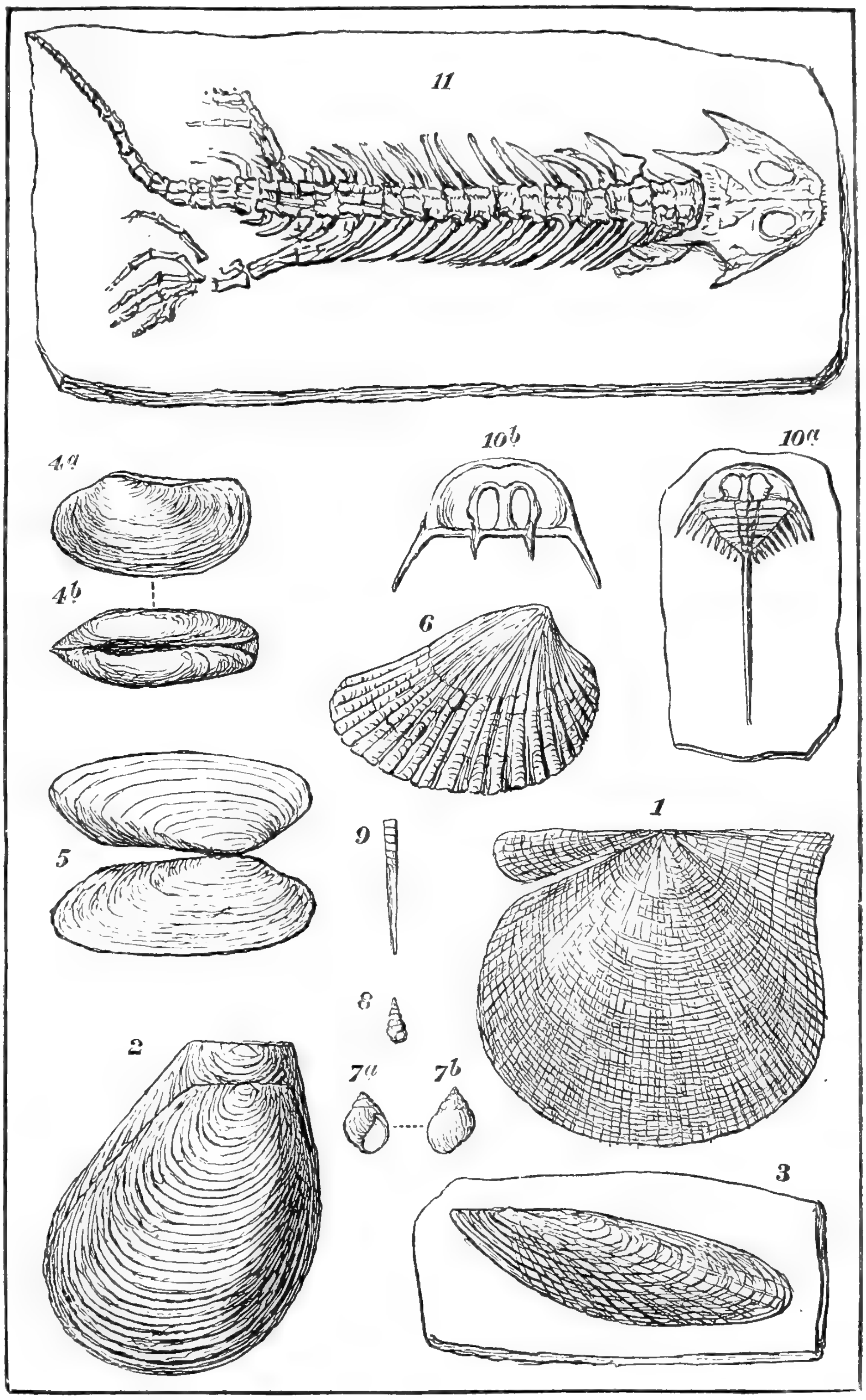


Fig. 25.—Upper Carboniferous (Coal-Measure) Fossils. From Kinahan's "Geology of Ireland," Plate IV.

MICROSCOPY IN NATAL.—I have much pleasure in informing you that we have, in our little colony, just founded a microscopical society, which bids fair to be very successful. It is called the "Natal Microscopical Society," and is under the presidency of Julius Schulz, M.D.—*Stephen C. Adams*, Hon. Sec.

SECTIONS OF QUARTZ.—Would Mr. J. Clifton Ward kindly describe how he obtains and prepares for the microscope the "slices" of quartz he speaks of in his interesting articles in SCIENCE-GOSSIP?—*R. S. P.*

DIATOMS IN COAL.—In reply to F. W. Kitton's communication, I only write to say that, when I saw diatoms in coal first mentioned, I tried the ashes of the coal we were then burning, and found abundance of them of several different kinds, and from several different specimens of ashes, but I do not think they will be found in all kinds of coal.—*Edward Thomas Scott.*

ZOOLOGY.

SCIENCE IN THE PROVINCES.—The number of "Proceedings," "Transactions," &c., which reach us, setting forth the work done in the scientific centres which now exist in almost every town in Great Britain, is increasingly great. One of the best managed of these provincial societies is the West Cumberland Association for the Advancement of Literature and Science, which is formed by the union

of eight societies in as many of the Cumberland towns. Their "Transactions" form a tolerably large annual volume, and part iii. is now to hand, containing, among other papers, reports, and presidential addresses, one on "The Probable Condition of the Interior of the Earth," by Sir George Airy, K.C.B., F.R.S.; on "Quartz," by Mr. J. Clifton Ward, F.G.S.; "Boulder Clay," by Charles Smith, F.G.S.; "Common Beetles," by W. Duckworth; &c.—The annual report of another flourishing and vigorous society, the Belfast Naturalists' Field Club, is also before us, containing, besides several papers of more than local interest, the result of special geological research in the Silurian rocks of county Down, by William Swanston, F.G.S., and their hitherto unknown and unclassified graptolites, by Mr. Charles Lapworth, F.G.S. Mr. Joseph Wright, F.G.S., also gives a carefully worked out and arranged list of the recent foraminifera of Down and Antrim. These three contributions would alone make any report valuable to naturalists and geologists generally. There are also papers, chiefly geological, by Messrs. W. Gault, W. Gray, &c., and well-written accounts of the summer excursions.—The twentieth report of the East Kent Natural History Society has been sent us, showing a healthy state of scientific activity. The abstracts of the papers read at various meetings are very clear. Prominence appears to be given to microscopical examination of natural history subjects, to which Mr. James Fullagar, Mr. Hammond, and Professor Gulliver contribute very importantly. There is also a good abstract of the address by the president (Mr. G. Dowker, F.G.S.) on flint stones and banded flints.—The Dulwich College Science Society have issued their first annual report, and we cordially hope it will be the pioneer of many to follow. It commences well, by "reporting" on the botany, zoology, &c., of the neighbourhood, and contains abstracts of papers read at the bi-monthly meetings.—The Eastbourne Natural History Society is favoured by having several naturalists of note among its leading members. Mr. Roper, F.L.S., has recently addressed the society on "The Additions to the Fauna and Flora of the Crickmere District during the Past Year."—The North Staffordshire Natural History Society have had several important summer outings, at which interesting papers have uniformly been read. —The various societies at Burton-on-Trent, Nottingham, Birmingham, Leicester, Northampton, Tamworth, &c. have had capital abstracts of their proceedings published in the "Midland Naturalist," which has now reached the conclusion of its first volume, and proves a most ably edited "Journal of the Associated Natural History, Philosophical, and Archæological Societies and Field Clubs of the Midland Counties."

THE GEOGRAPHICAL DISTRIBUTION OF ANIMALS. —We have received a coloured map showing the six geological divisions of the globe, according to Wallace and Sclater. It is published by Messrs. W. & A. K. Johnston, and has been arranged by Dr. Andrew Wilson. The map is accompanied by a small handbook, which gives the necessary explanatory matter.

THE BLACK-THROATED STONECHAT.—At a recent meeting of the Zoological Society, Dr. Sclater exhibited and made remarks on an adult specimen, in full plumage, of the black-throated stonechat (*Saxicola stapazina*), which had been obtained in Lancashire, and had been sent for exhibition by Mr. R. Davenport, by whom an account of it was lately written for SCIENCE-GOSSIP. The species had not been previously recorded as occurring in the British Isles, and is an interesting addition to the list of "Accidental Visitors."

THE BLACK-THROATED STONECHAT IN LANCASHIRE.—Your correspondent, "R. Davenport," in the October number of SCIENCE-GOSSIP, may congratulate himself on being the first to record the occurrence of *Saxicola stapazina*, or "russet wheatear," in the British Isles. I have for years anticipated and longed to hear of the appearance of this species on our side of the Channel, and wondered why (at least) a straggler should not occasionally appear at the same time with its near relation, *S. œnanthe*. There is a capital coloured figure and description of *stapazina* given, amongst other continental or European species, in Bree's "History of the Birds of Europe not found in the British Isles."—*John Gatcombe.*

ZIPHIUS CURVIROSTRIS.—The drawing forwarded to me is undoubtedly that of the skull of a specimen of *Ziphius curvirostris* (Cuv.), a species often found in the Mediterranean (see my article on "The Seals and Whales of the British Seas," SCIENCE-GOSSIP for February 1878, p. 29). Dr. J. E. Gray, in his "Catalogue of Seals and Whales in the British Museum," says that this species "has long been regarded as fossil. It really exists in the Mediterranean. The skull described by Cuvier ('Oss. Foss.' v. t. 27, f. 3) was found by the fishermen of the Gulf of Bouc. Others have since been obtained, and each of them has been described as a new species." See also Professor Flower "On the Recent Ziphiod Whales," "Trans. Zool. Soc." vol. viii. p. 207. Professor Fowler has seen the drawing forwarded by M. Piercas, and has no hesitation in ascribing it to this species.—*T. Southwell.*

PRESERVING SKINS, &c.—The following is a French substitute for arsenical soap:—Savon blanc, 625 grammes; sulfate d'alumine et de potasse, 250 gr.; sous-carbonate de potasse pulverisé, 125 gr.; chlorure de sodium, 125 gr.; chaux en poudre, 250 gr.; camphre en poudre, 60 gr.; eau, 750 gr.; huile de pétrole, 60 gr. Gently boil the soap and salts together in two-thirds the water. Mix the lime with the

remainder. Dissolve the camphor in the petroleum. Mix the whole when cold.—*J. S.*

Portuguese Man-of-war (*Physalia pelagica*).—It will doubtless be interesting to many of your readers to learn that a specimen of this exquisitely beautiful marine creature has been picked up at the Isle of Wight. During a storm which prevailed about the middle of October last, I was watching the waves at Bonchurch, when I observed a singular-looking object on the beach. Upon a closer inspection I discovered it to be a fine specimen of the *Physalia pelagica*. In the "Intellectual Observer," published in November 1862, an accurate figure is given of one, also obtained at the Isle of Wight in July of that year. The colour of that found by me was, however, of a richer crimson, nearly the whole of the semi-transparent membrane being of that colour, the *surface* of this membrane being tinted with an exquisite blue, so that, when held at any angle, the most lovely shades of purple, blue, or crimson were to be obtained, giving the exterior of the object the appearance of shot silk. The pendent tentacula were slightly injured, but still retained their lovely blue colour. Being at some distance from home, and having no vessel in which to convey it, I returned it to its native element, but fear that it did not long escape destruction upon the pebbly beach, upon which the waves were breaking with great force.—*Edward H. Robertson.*

"Health Primers."—By this title, Messrs. Hardwicke & Bogue have issued the first instalment of simple handbooks on health subjects, such as any-one can afford to purchase (a shilling each volume), and anyone can understand and be interested in when bought. They are severally written by the ablest medical writers of the day; and the complaint is now altogether removed that clearly written and inexpensive books on subjects of this kind do not exist for the benefit of the masses. The first four volumes treat on—"The House and its Surroundings"; "Exercise and Training"; "Alcohol: its Use and Abuse"; and "Premature Death: its Promotion and Prevention." These books are capitally got up, with good type and good paper.

Science-Gossip Folk-lore.—Mr. James Britten, F.L.S., has compiled a capital and useful Index to the Folk-lore in the First Series of Hardwicke's Science-Gossip, vols. i.–xii. (1865–1876), which has appeared in the "Records of the Folk-lore Society."

The Bony Pike (*Lepidosteus osseus*).—This well-known living representative of the nearly extinct order of ganoid fishes, so abundant in the seas of the primary epoch, is not uncommon in the North American lakes and rivers. Within the last few months the development of the young fish, as they escape from the eggs, has been studied by Professor A. Agassiz, who says "that, notwithstanding its similarity in certain stages of its growth to the sturgeon, notwithstanding its affinity with sharks by the formation of its pectorals from a lateral fold, as well as by the mode of growth of the gill-openings and gill-arches, the Lepidosteus is not at all so far removed from the bony fishes (Teleostei) as is generally supposed."

BOTANY.

Epipactis purpurata (Sm.).—I have found this plant growing in tolerable abundance under the shade of a clump of trees. It seems to me to be quite a different variety from *E. latifolia*. The whole plant is larger, except the leaves, which are much smaller and narrower in proportion, and lie closer to the stem, than those of *E. latifolia*. The stem and roots are thicker and more fleshy, and the latter grow much deeper in the ground than those of *E. latifolia*. The flowers are always of a yellow-green colour, slightly tinged or lined with pink, there being no difference of colour within the lip. The lower bracts are twice as long, and the upper ones about the same length as the flowers. I have found *E. latifolia* both in chalk and alluvial soil; but *E. purpurata* in the latter only. I have seen nothing intermediate between this plant and *E. latifolia*. Its purple colour is most decided.—*Walter Longley Bourke.*

Vegetable Moth-trap.—In reply to your inquiry in page 259 of Science-Gossip for November, my attention was directed to the number of insects, moths, bees, &c., caught by the flowers of Physianthus growing against a house at Newton Abbot, Devon, in 1875. My impression is, that they do not die in two minutes, but that some of them, at least, live for two or more days after being caught. I have had an opportunity every year since 1875 of observing this plant, and though it exudes a thick milky juice on fraction, I cannot discover that this is of a narcotic or soporific nature, as many insects which appeared to have been some time captive, flew away readily on being released. I am inclined to believe that the action is purely mechanical, but have been unable to discover whether the plant has any power of opening and closing the trap, or whether the insects entangle themselves. I have reason to believe that many have been more or less entrapped two or three times before their final capture. It would take too long to enter into a minute description of the structure of the flower, which I have minutely examined. I brought this plant before the notice of the East Kent Naturalists' Society in 1875. The plant to which I allude is growing in the open air with a south or south-east city aspect, but though it flowers profusely, it has never formed seed: can you explain this?—*John P. Hall.*

PHYLLACTIDIUM PULCHELLUM.—I have a large number of freshwater plants, *Phyllactidium pulchellum*, growing upon the glass sides of a tall cylindrical Vallisneria aquarium, and as in SCIENCE-GOSSIP, 1867, p. 178, it is requested that new localities for this plant should be made known, I herewith send the information. The water was furnished from the Kennet and Avon Canal at Bath, but it has frequently been supplemented by ordinary rain-water.—*R. H. Moore.*

A NEW CATALOGUE OF BRITISH PLANTS.—The Rev. George Henslow contemplates printing a catalogue of British plants, arranged according to Hooker's "Student's Flora." Any one wishing for copies, is requested to communicate with him at 86 Titchfield Terrace, Regent's Park, N.W.

MALFORMATION OF THE WALLFLOWER.—A peculiar growth of this fragrant plant was recently observed by me, the peculiarity in this case partaking of a combination of petals, stamens, and pistil, to form a six-celled body. The sepals of the calyx were dark purple—almost black; the plant remarkable for vigorous growth. In florists' flowers, stamens and pistils are converted into petals; in this instance there is a reversion of this phenomenon in a spontaneous manner.—*M. King.*

AUTUMN RAMBLE IN EPPING FOREST.—Dr. De Crespigny is hardly right when he says, regarding Agarics (p. 254): "In one sub-genus there is no stem—Pleurotus." The larger species of this sub-genus have a distinct and often very large stem, some indeed being furnished with an annulus. *A.* (*Pleurotus*) *Ulmarius* (illustrated as stemless on p. 252) always has a thick stem. Mr. Berkeley's *A. Ceciliæ* certainly grows in Epping Forest, but it is not a "much smaller" species than *A. rubescens*; it is in characteristic specimens much larger: indeed *A. Ceciliæ* is a decidedly large Agaric; its correct name is *A. strangulatus*, Fr., *A. Ceciliæ* being a synonym. Why is *A. nudus* said to be "probably a very dangerous species"? I have known it eaten without ill-effect during late years. *A.* (*Pholiota*) *aureus* described as growing near the "Wake Arms," does not grow in Epping Forest: the plant mentioned by Dr. Crespigny is *A. spectabilis. A. aureus* found a place in Berkeley's "Outlines" by an inadvertence: it has only been known of quite late years as a British plant. A few years ago a variety of this species was found at Downton, near Ludlow, whilst I detected the true plant at Perth, three years ago. *A. aureus* is very rare, whilst *A. spectabilis* is common everywhere.—*W. G. Smith.*

A STRANGE PLACE FOR MARSH PLANTS.—I have been interested in the record of the occurrence of plants in the new docks at Leith, as given by Mr. Douglas in the last number of SCIENCE-GOSSIP. As all the plants given in his list are natives of the south side of the Forth, and are to be found all along the coast from Bowness to North Berwick (in damp and marshy places) it is quite unnecessary to *imagine* the previous existence of a *stream* in order to account for their appearance; most of them used to grow at the Figgat Whins, between Leith and Portobello.—*A. Craig-Christie.*

MONSTROSITY IN DIGITALIS PURPUREA.—An instance of monstrosity in the flower of a cultivated foxglove came under my notice last summer. It was

Fig. 26.—"Monstrosity" (*Synanthy*) in Common Foxglove.

an example of the malformation called "synanthy," which consists in the more or less complete union of several usually distinct flowers. Dr. Masters, in his "Vegetable Teratology," p. 40, illustrates a somewhat similar case, and indeed shows that the corolla of the foxglove is liable to various forms of monstrosity, such as the production of a spur, the formation of a polypetalous corolla by fission, and the occurrence now and then of a regular corolla. In the specimen I have here figured, the flowers at the top of the raceme not only

grew together into a cluster, but so grew as to form a single cup, nearly four inches in diameter, not unlike a shallow convolvulus with a very irregular margin. The cup so formed, however, was not complete, having a slit down one side—a feature I should perhaps not have noticed had not the figure in Dr. Masters's work shown the same formation very plainly, whence I infer that it may be usual. Inside the cup was only a confused mass of distorted petals, stamens, or carpels, while below it was an involucre formed by the cohesion of the bracts of the several flowers. When I gathered the specimen last June, every other stalk on the plant showed promise of producing a similar irregularity, though then only in bud.—*John W. Buck, B.Sc., New Kingswood School.*

DESTRUCTION OF ISOETES LACUSTRIS BY FISH.—I was geologising lately at the lakelets on the ice-worn summit of Fairhead, county Antrim, and observed a large quantity of fragments of the quill-like leaves of *Isoetes lacustris* floating in the water. On examining the pieces I found they were all freshly champed and bitten, the broad, flattened part of the base was in every instance almost eaten away. Turning into a shallow little bay, I found this wholesale destruction of this very interesting plant was caused by a number of common black trout. They were busily engaged nibbling and biting off the basal part of the quills. I saw several of them with portions in their mouths darting away into the deeper water. The weather was very dry, and had been so for a long time previous; in consequence, the water of the lakelets was low, and the brooklets flowing into them were all dried up. The supply of worms and other food brought down into the lakelets by the streams was cut off owing to this cause, and the fish were forced to feed on the Quillwort. This was the only plausible explanation I could offer to account for the strange conduct of the fish, but perhaps some of the readers of SCIENCE-GOSSIP have observed something similar, if so, I would very much like to be informed of the circumstance. In conclusion, I may state that the Quillwort, *Isoetes lacustris*, is a very rare and local plant in this district; only two stations are recorded for it in county Antrim, these are the little lakelets on Fairhead, and the river Bann, near Jackson Hall.—*William Gault, Belfast.*

GEOLOGY.

DWARF FOSSIL CROCODILES.—Professor Owen has recently described some fossil crocodiles found in rocks of Purbeck age, under the name of *Theriosuchus pusillus.* This crocodile was only 18 inches in length. As regards its derivation, it appears to be related to the theriodonts of the Trias.

THE UPPER GREENSAND CORAL FAUNA OF HALDON, DEVONSHIRE.—This was the title of a paper recently read before the Geological Society, by Professor P. Martin Duncan, F.R.S. The author in this paper stated that since the publication of his supplement to the "British Fossil Corals," published by the Palæontographical Society, several new corals have been obtained at Haldon by Mr. Vicary, of Exeter. Twelve additional species were noticed, of which ten were new. This brings the total number of species in the Haldon greensand up to twenty-one. The new species are thus distributed:—Aporosa: Oculinidæ (1), Astræidæ (3), Fungidæ (5); Perforata: Turbinariæ (2); Tabulata (1). The paper concluded with remarks on the genera and species represented, from which it appeared that the coral fauna of Haldon is the northern expression of that of the French and Central European deposits, which are the equivalents of the British upper greensand. The Haldon deposit was formed in shallow water, and the corals grew upon the rolled débris.

HOLES IN OOLITIC LIMESTONE.—In SCIENCE GOSSIP for November, F. N. D. asks why holes are found in oolite beneath sand. I cannot say for certain that the cause I have seen at work with a similar effect is certainly the cause for the holes mentioned; but as I know of no other equally efficacious, I tell him what I have seen. Holes in limestone and basaltic rock caused by small surface hollows—water percolating through the superstructure acts on sand particles in these hollow places, and the sand grains act as gimblets or gouges by constant friction; the rock is worn away, and holes are made for a few inches to many feet in diameter. In the large holes pebbles and gravel take the place of sand, and wear out deep cavities; in places where the water action is confined to dripping, the holes are deep and uniform; where they are exposed to running water the erosion assumes varied shapes. The holes described by F. N. D. are most likely made by water drops and sand in a rock formed of some shale or soft material.—*H. P. M.*

THE THERMAL SOURCES OF CARLSBAD.—The recent demolition of a house has led to the discovery of a remarkable geological fact—the existence of a peculiar zone, about 15 to 20 metres broad, between the steep pyritose granite, with frequent veins of hornstone on which the town tower stands, and the similarly pyritiferous granite creeping out beneath the terrace of the Schlossberg. This zone is filled up with a breccia of granite and hornstone, with thermal waters circulating everywhere within its fissures, and depositing on their inner surfaces crusts and veinules of arragonite, some of them 1½ metre thick. The temperature of the whole zone is high, on account of the warm water and steam issuing out of every cleft and crevice.

MARINE FOSSILS IN GANNISTER BEDS.—I was much surprised to learn that Professor G. A. Lebour announced the discovery of marine fossils in the lower coal measures or "gannister beds" of Northumberland, and that "hitherto no marine fossils had been

met with in these rocks." We in Oldham are situate within an easy walk of a long and well-developed outcrop of these gannister beds, and I have been intimately acquainted with them for upwards of twenty years, yet, in a palæontological sense, it has never occurred to me that this series, with some limitations, could have had any other origin than a marine one. From the time of my first acquaintance with these beds I have believed that such fossils as Goniatites, Orthoceratites, and Nautili, were the remains of marine mollusca.—*Jas. Nield, Oldham.*

WHAT ARE CONODONTS?—It will interest our geological readers to know that at another recent meeting of the Glasgow Natural History Society, Mr. John Young stated that he has been enabled to compare Mr. Smith's carboniferous limestone conodonts with the series of Silurian forms so beautifully figured in the plates of Dr. Pander, and that he finds in these plates that at least five of the Silurian genera are represented amongst the carboniferous specimens. These genera are Cardylodus, Gnathodus, Ctenognathus, Prionodus, and Lanchodus. Of some of these genera there are one or two species that are so closely related to the Silurian forms that it is difficult to point out any characteristic distinctions between them. Mr. Young stated that Professor Owen in his "Palæontology," first edition, p. 96, says, "The writer, after the closest comparison and consideration of the evidence, is disposed to regard only those referred by Pander to the genera Ctenognathus, Cardylodus, and Gnathodus, as having any probable claim to vertebrate rank." It is therefore interesting to find, as already noted, that these three genera are represented amongst the carboniferous forms, and it becomes highly probable that the other genera may yet rank amongst the vertebrates likewise. In the deposits yielding these remains are found beautifully preserved vertebral bones, apparently of small fishes, while another tooth somewhat closely related to Aulocodus (Pander) and scales like Cœlolepis (Pander) are also found. Mr. Young also stated that amongst Mr. Smith's specimens were one or two slides of stout, minute, conical teeth, about a line in length, of a round form, slightly curved, hollow at their base, and tipped at their points with transparent dentine or enamel. These teeth differ from the conodonts figured in Pander's plates, in being nearly circular in section, while the Silurian forms in most instances have sharp opposite margins. The carboniferous specimens may therefore belong to true fishes, of which there is plenty of other evidence in the same beds.

NOTES AND QUERIES.

DO BLACKBIRDS MIGRATE?—In the spring of 1876 a brood of blackbirds was hatched in the nursery of Messrs. Lott & Hart, of Faversham, one of which, a cock-bird, was mottled, one wing being entirely white, which made it very conspicuous, and on that account it was spared from being shot when it helped itself to the cherries. In the early autumn it was lost sight of with regret, being often looked for during the winter, but was never seen; and it was thought that it had fallen a prey to some one who had the propensity for putting into a glass case every bird that had the misfortune to differ from its fellows. But in the spring of 1877 it reappeared, and either found or brought a mate with it, and built a nest in the garden, where it remained all the summer, being the only bird that held the royal prerogative of helping itself to the fruit with impunity. In autumn the bird was again missing, and it was thought that it had come to an untimely end; but on the evening of March 4 it again made its appearance, and, perching on a fruit tree quite close to the house, it made the inmates aware of its presence by singing its evening chorus with all its might. It would thus appear that the blackbird does not stay in the same neighbourhood all the year. Do they pass south for their winter quarters like the ring-ousel, which we see passing southwards in the early autumn? these stay with us for one day, helping themselves to the mulberries, of which they seem very fond, and then are seen no more.—*James Pink.*

PRESERVING REPTILES.—I should be much obliged if you could give me any good way of preserving reptiles, more especially frogs and newts. I have read that, if put in a bottle of corrosive sublimate and spirits of wine, it takes them a long time to die, and they are in great agony all the time. By stating, first, how to kill, and, secondly, how to preserve, you will oblige—*Alfred Wheldon.*

STUNG OR SCALDED BY PARSNIPS.—I was surprised a few weeks ago to receive a note from the Island of Guernsey, from which I quote:—"I have been poisoned round my wrists, so that I could not write. You must know that parsnips collect quantities of dew, and if we touch, or are touched by, the most minute point of a leaf while the dew is on it, a red spot comes, which brings intolerable itching, especially when warm in bed; then each spot turns into a nasty yellowish blister full of very hot water. When that bursts, it leaves an open sore, as painful as a boil, which takes a long time to heal, and which continues itching till quite dried up." And in answer to an inquiry from me: "Only when wet with dew will they sting or blister; rain does not do it. Every farmer or agricultural labourer in the island has suffered from it." I may just add immense quantities of parsnips are grown on the island for the cattle, the soil being peculiarly suited to them. As I have not seen this stinging or "scalding," as it is called by the workmen, I should like to ask your readers if it be commonly met with in England, or is it peculiar to the island?—*Spes non Fracta.*

POSITION OF YEWS IN CHURCHYARDS.—Has it been noticed that, as a rule, yew-trees in churchyards are on the south of the church? In twenty churchyards in East Surrey I find there are only two or three yews out of about forty that are north of the centre line of the church. I should be much obliged if any of the readers of SCIENCE-GOSSIP living in Surrey would inform me which churches in their neighbourhood have yews and which have not, especially to be informed certainly that the South London parish churches have none, as this would save me much unnecessary trouble; also of any traditions or reasons why they should be planted in churchyards.—*E. Straker.*

DEVELOPMENT OF FROGS' SPAWN.—On March 20, at 9 A.M., I collected some fresh spawn (there

was none on the previous evening), and placed it in a vessel out of doors. On the 24th, I brought half my collection into a greenhouse, temperature about 50° Fahr. On the 30th, the tadpoles in the greenhouse were free of the albumen, while those out of doors, after being several times under ice, were nearly all free on April 7.—*R. B. C.* (*Ware*).

CATS AND RABBITS.—It does occasionally happen for the cat to give suck and bring up rabbits. A few years ago I got three young rabbits, at the time my cat's kittens were destroyed, when the youngsters were put into the basket beside the cat. She, by all appearances, was pleased with the change; in a short time they were sucking. I kept them about nine months, but had to part with them, owing to their mischievous propensities. Last year a farm servant in the neighbourhood of Kelso got two young rabbits. The cat having kittens at the time, the rabbits were placed as a substitute for the kittens. The cat took well with the change; the rabbits, when they got older, became so mischievous that they tore everything tearable that came in their way. They were taken to a rabbit burrow a considerable distance off, but the old cat succeeded in finding them out and conducting them safely back to their cottage-home. There are authentic cases on the Borders of the fox-terrier taking a liking to kittens, and even beating off their own mothers, and the collie-dog nursing young pigs.—*R. R. Fans, Earlston.*

SUCCESSFUL BREEDING OF THE FOX MOTH (*Bombyx Rubi*).—In the months of September and October the abundant number of the caterpillars of this moth has often been observed. What with weather and other causes, few become perfect insects. For a few years back I have often tried to breed them, but was never successful till I took the following plan. I got a rough heather turf, sheltered it from the north and east winds, made a wood frame covered all over with thin cloth, and put thirty-six caterpillars into it in October, and in June I had the pleasure of seeing thirty-five perfect insects.—*R. R. Fans, Earlston.*

FAGUS, &c.—The "Fagus" of the Latins could not have been the chestnut, for this tree was known to the Romans by the name of *Castanea nuces*, it having been first found by them at Castanea, a town of Thessaly, near the mouth of Peneus.—*Mrs. Alfred Watney.*

NATTERJACK TOAD.—In reply to your correspondent, J. Perrycarp, I have kept a natterjack for a considerable time, and have never found it to emit any odour. Does he not mean the common snake, which, like most snakes, gives forth an offensive odour when irritated or under sexual excitement?—*J. M. Campbell.*

OUR BRITISH SNAKES.—The blind-worm does not "carry its young in a case in its back," the young being hatched shortly before they are brought forth. The adder is also ovo-viviparous, the egg bursting in the act of parturition. The ringed snake, on the other hand, is oviparous, leaving its egg to be hatched by the solar heat.—*J. M. Campbell.*

HOW LONG CAN A FISH LIVE OUT OF WATER?—I have on more than one occasion had proof of the tenacity of life in some fishes, particularly those of the perch family. Two instances are still fresh in my memory: one where a goldfish which had been taken from an aquarium had been left on a plate from six till twelve o'clock at night, and being again placed in the water swam about as vigorous as ever; the other, a roach, had been kept four hours out of the water, with a like result on being replaced.—*J. M. Campbell.*

LATE SWALLOWS.—I find in Letter 21 of Gilbert White's "Selbourne," dated November 28, 1768, that one of his neighbours saw a martin in a sheltered nook, on a fine sunny day, hawking for flies; he also states he is perfectly satisfied they do not leave this island in the winter. It is singular that in the first week of this month in my garden I have seen several pairs of swallows busily engaged in their favourite pursuit of fly catching, although the nights were very cold; their numbers, however, dwindled down, and on November 27 last one pair only could I find in the district, and that pair about my garden. I saw them every day until the 12th. The night of the 11th was a very cold, frosty one. I found them in the morning sitting very disconsolately on the spouting of the dwelling-house, taking occasionally a short flight and returning to the same spot. I have never known the swallow (*Hirundo rustica*) so late before. It seems to me that Gilbert White is right in assuming that some of the flights are left behind.—*S. Griffin, Salisbury.*

INTELLIGENCE IN MAN AND ANIMALS.—From time to time we read in your journal anecdotes of animals, the writers of which suggest that they may be possessed of reason, in the sense that from two premises they draw a conclusion. The great difficulty in the investigation of the minds of animals appears to be that man instinctively and unconsciously, unless checked by reflection, explains their actions, especially in extraordinary cases, by his own modes and laws of thought. The dog, for example, is considered one of the most intelligent of quadrupeds, and numberless are the cases I have seen quoted to prove that he is possessed of reason; but in every instance it appears to me that though his actions might and would in the case of a man have been dictated by reason as above defined, it does not appear at all certain that such is the true explanation of the phenomena, at any rate it is dangerous, scientifically speaking, to attribute to reasoning powers what may perhaps have another explanation. I purposely refrain from quoting any of these alleged instances of reason in the lower animals, merely wishing to suggest the difficulties in the way of decision. If it could be proved that a dog deliberately chose one of two courses of action, the case of reason would be established. It is for his fidelity, attachment, and courage in defence of his master that the dog has endeared himself to man. In man's vocabulary these are called moral qualities, but in a dog they are not the result of choice and a distinction between good and evil, but are part of his nature, primal impulses (possibly affected by training) of which we know nothing; and it is as illogical to praise the dog for their possession as it would be to blame a magpie for secretiveness or a tiger for ferocity. There appears to be an impression that the intelligence of animals differs from man's only in degree. There is a difference between a beggar and a prince, says the old song, but this, however, is but one of degree; but until clear cases of reasoning are proved, and the numerous mysterious instincts of animals explained, surely are we not warranted in assuming that the intelligence of animals differs from that of man not only in degree but in kind?—*H. D. Barclay.*

THE "CHIFFONIER," OR "OLE CLO'" AMONG THE INSECTS.—I was amusing myself this last August in watching the habits of spiders and other creatures in the window, and on the broad window-ledge of an unoccupied apartment in a villa at Bellosguardo, near Florence, and collecting specimens for my microscope,

when I saw what, for the moment, I imagined was a little nest of spiders' eggs being blown along the ledge; but I perceived on closer inspection that the object was not the usual dainty little spider's nest, but a rather untidy, fluffy ball, about the size of a large pea, and that the object was steadily and rapidly moving along of its own accord, stopping now and then for a second and then resuming its journey. To my amazement, I then saw that the ball of fluff was borne on the back of a little insect, greyish-white, somewhat resembling the larva of the dermestes, and that the untidy but spherical mass was surely composed of cobweb, held on the creature's back by being twisted about in and out among the long projecting hairs which were on the upper surface of the body. The insect was about a quarter of an inch in length, and bore on its head a pair of forceps about the size of those borne by the common earwig, but for a totally different purpose; for, to my amusement, I noticed that each time the creature paused it was to pick up with these forceps some dead ant, or portion of a dead insect; legs, wings, scales of the common wood-louse, or crumb of a thorax dropped from some web after the meal of a spider; and these fragments were picked up so deftly, and in so droll a way did the creature turn its head round, and carefully arrange his treasure on his pack so as neither to lose it nor his balance; the movement was so cunning and so curious, that I was forcibly reminded of the chiffoniers in France and Italy, with their hook and their basket, and of the "ole clo'" and his pack in England. And, quoting Mr. Squeers, I involuntarily exclaimed, "Well, Nature's a rum-un!" and called my friend to watch the creature with me. For more than two days I kept it in a small glass-lidded box, supplied it with "ole clo'," and watched it constantly collecting and packing; but I never saw it feed, and one morning I found that a large ant I had supposed to be dead had attacked and eaten the creature, scattering the fluffy pack and its contents all over the box. Some weeks after this I received a note from a young friend at Vevey, who from my description recognises the "chiffonier," two of which, she says, "came towards me, on the table in the garden where I was seated reading, *collecting* and *packing* as you described." From my friend at Bellosguardo I also, on my return to England, received an account of one she had found, and of which she thus writes: "I had half a mind to send you one of those scavenger, or 'ole clo'' insects which Mr. P. found; but could not arrange anything that would insure its arriving alive. The pack on his back is much less choice than the others, consisting of parts of the bodies of dead flies, spiders' cobwebs, &c., while he himself is much smaller. I feel quite sure it is his food he collects, because the first night I put him under a tumbler he ate the wings of his fly, the only ornamental article in his collection. He is exceedingly fond of sugar, has eaten, I am sure, twice his weight, and has just added two small dead ants to his load, under which he staggers visibly. His pack is held on by long projecting hairs, and likewise secured and strengthened by cobwebs." Whether we have any "representative" insect chiffonier in England I do not know, but thought this little sketch of the insect might interest some of your readers.—*S. M.*

PEREGRINE FALCON.—It may interest some of the readers of SCIENCE-GOSSIP to know that a young male peregrine (*Falco peregrinus*) was shot at Moor Street, in this neighbourhood, on the 11th November, 1878.—*Roland Green, Rainham, Kent.*

SUPERSTITIOUS DISLIKE OF THE WREN.—In July's SCIENCE-GOSSIP a correspondent admits he has occasionally met with instances of this superstition, but has always been unable to trace the reason for such an aversion. I may mention an old Irish tradition or legend, viz., that the Saviour, as alleged, withdrew Himself, and took refuge under a tree, desirous to be concealed, and the Robin carried moss and laid it over the tree, making the covering more dense, which so pleased the Lord that He blessed the bird, and putting forth His hand left the red mark on its breast; but the Wren came and carried away the moss, and so exposed His retreat, hence it is the "Devil's Bird."—*Wm. Lipsett.*

SPIDERS' WEBS.—Though I have often examined spiders' webs in all sorts of odd corners, I have never found any in cupboards where there was nothing for them to catch. In fact, in most instances the webs have had remains of flies, and especially moths, hanging about them. I, therefore, though agreeing with the opinion of your correspondent in the September number (the last clause excepted, which requires proof), think that the webs are also intended for the purpose of catching the semi-dormant moths and flies which retire into these dark corners. Moreover, the webs, though thicker and more closely woven, have always appeared to me quite as well adapted to their purpose as those anywhere else.—*An Observer of Spiders.*

THE EARTH-WORM.—Two or three days after reading the interesting article by Professor Paley, in SCIENCE-GOSSIP for June, on the habits, &c., of the earth-worm, my attention was attracted by the singular movement of the lower leaf of a geranium. Moving closer to it I found this was caused by a common lob worm, its hole being some distance from the leaf, it had to reach almost the whole extent of its body, catching hold of the leaf, it contracted its elastic body, until it had it almost within the mouth of the hole, but the leaf being still on the plant, it, of course, sprang back to its original position. This the worm attempted with great patience a number of times, but eventually finding its exertions of no use, it contented itself with a few pebbles, filling up the entrance with them, in the same manner as explained by Professor Paley.—*C. B.*

TENACITY OF LIFE IN A WASP.—Some time ago I made an experiment on the insect above-named in order to know something of sensation in the insecta. Securing a wasp, I severed the head from the thorax, and the thorax from the abdomen. In the thorax all motion seemed to cease in a few moments, but in the head vitality was maintained for several hours, and the motion of the tongue out and in alternately was performed with as much vigour as is usual to the creature, then it gradually ceased. The abdomen retained vitality for fully four days, and when touched would contract and the sting be protruded. This seems to me rather strange, as the abdomen is farthest removed from the cerebral ganglion.—*J. D. O.*

KESTRELS' NESTS.—Thinking it may interest some of the readers of SCIENCE-GOSSIP, I append a few notes of four kestrels' nests which lately came under my observation, showing a strange diversity in nesting habits for birds of the same species. The nests were—three of them placed in a fissure of a limestone cliff, some thirty feet from the ground—and the fourth among the stems of the thick ivy, which covered part of the rock. In two instances, however, no nest at all (in the usually-understood sense of the word) was made, the eggs, five in number, being laid on the scanty soil, which scarcely covered the rock. The third nest, though in an exactly similar position, was elaborately constructed of twigs and small roots, and

neatly lined with moss and wool, which was worked up with mud to a firm consistency. The fourth nest in the ivy was very roughly made, being, I think, an old jackdaw's nest "patched up," this last contained four eggs in the last stage of incubation. Directly under it, at about a yard's distance, was a nest containing five young jackdaws, and these continued unmolested by the hawk, sitting above them, till they were fully fledged.—*C. Candler.*

HOUSE-FLIES AND THEIR PARASITES.—A friend of mine, a few days ago, observed a common house-fly walking with apparently great difficulty and pain upon the counter of his shop. Taking a glass he looked closely at it and discovered that its lameness and pain were evidently owing to something upon one foot, which, however, he could not clearly discern, owing to the low power of his glass. Taking, however, the sharp blade of his penknife he pressed it upon what he thought was a growth from the foot, but the leg of the fly came off. This object he brought to his home, when we placed it under the microscope, at first under a small, afterwards under a high power, $\frac{1}{4}$ inch; we then discovered what a formidable creature it was, and could well understand the intense pain that poor little fly must have suffered, dragging with it, without any hope of shaking off, so fully armed a parasite. Its length I estimate about the one-twentieth part of an inch, its shape that of a bottle, its snout quite pointed, and its mouth filled with sharp teeth, which we could readily distinguish under the high power of $\frac{1}{8}$ inch. Its body was covered with apparently sharp bristles, it had four legs on each side, and near its snout a pair of most terrible-looking instruments exactly resembling the large claws of a lobster. Its colour was that of the leg, viz., dark brown. Certainly in all my researches I have never seen a more terrific-looking insect, and am not surprised at the fly being lame and in pain when within the clutches of so minute but so powerful an assailant. Have any of your readers noticed this creature, and can any one give me some information about it? Is it parasitic, or is it a foe of the fly, and only attacks it occasionally? I shall be exceedingly glad if any one of your numerous contributors can throw any light upon it.—*Rev. W. Marsdon Beeby.*

PIPING BULLFINCH.—While visiting in this neighbourhood a gentleman showed me a piping bullfinch, whose plumage during the last season has turned a complete dull black colour. The bird has moulted, but still it does not recover the variegations of its plumage; and, although a very clever piper, has not been heard to utter a note since the change came over it. The bird had been in the owner's possession for many years, so that no trick could have been played upon him. Can any of your readers account for this strange metamorphosis?—*St. Austell.*

PIPING BULLFINCHES.—M. E. M. H. would be much obliged if any one who has been successful in teaching a bullfinch to pipe a tune would give her his experience through these columns. She would particularly like to know what air he taught the bird, how long it took to learn it, and whether he was successful without a bird-organ?

SECOND GROWTH OF PLANTS.—Under this heading there are three notes in SCIENCE-GOSSIP for November on the second growth of various plants, and only one writer, D. Douglas, Leith, suggests that the late dry summer and the moisture of August "has probably something to do with the unusual abundance of these curious aberrations." The second growth is not confined to flowers, it extends to all plants when their roots do not run deep; it may be seen in cabbages, turnips, and potatoes; the action is a natural consequence of the laws of nature. Every plant is a duct for moisture from the soil, under the great law of attraction; when this law has exhausted all the moisture from the surface soil and surface roots, the plant they belong to ceases to grow. If the season continues warm, and showers fall, the growth is renewed where it ceased, flowers develop more petals, daisies grow double, twigs shoot out fresh sprouts, and even farm roots in dry soils grow afresh in strange shapes. It would be a question if the seeds of the second growth could attain perfection in annuals if the wet weather commences early. I do not see that the action can have anything to do with evolution, the phenomenon does not change the order. —*H. P. M.*

TERATOLOGY IN A MOSS.—In an old quarry I recently found a stem of common *Polytrichum undulatum*, which had *four* setæ, bearing capsules, springing from its summit.—*Young Muscologist.*

THE CRYSTAL PALACE AQUARIUM.—Mr. Gardiner, the secretary of the Crystal Palace Company, in speaking of the admirable manner with which their aquarium has been worked by Mr. Lloyd, says: "Our sea-water is now more brilliantly clear and healthy than it was when we obtained it, eight years ago; our animals (mostly those which we at first collected, and of great number and variety,) are in excellent condition; and we have never had occasion to clean any of our tanks, &c., the labour saved thereby, and the avoidance of disturbing the creatures, being very great. We never remove any excrementitious matters, large as is the quantity of food which the creatures eat, nor do these substances accumulate. They all are got rid of, or consumed chemically, as fast as they are formed. Naturally, we doubted the practicability of gaining these excellent results before we saw them attained, because no similar aquarium had before been erected in this country. Mr. Lloyd is now prepared to make a further and important improvement, in the direction of manufacturing sea-water for aquarium purposes, instead of sending for it from the sea. He made, and used, such water, with success, as recorded by him in print, more than twenty years ago, even when he had not succeeded in dissolving some of the ingredients of which actual sea-water consists. However, I have no reason whatever to doubt what he now says of his having succeeded in incorporating these things which he before left out, and that what he can now produce will be, not merely an *imitation*, but an *absolutely identical* mixture. I have to add, that, in obtaining water from the actual sea, unless a further and serious expense is incurred of going far out from the shore for such water, it is scarcely possible to obtain it clear, in large quantities, and in a given time, from near any coast, and consequently it arrives inland much contaminated with decaying organic matters, which have to be removed before the water can be used. Here this cause occasioned us some months of loss of valuable time before we could open our aquarium. But in using artificial sea-water clearness and purity can be obtained from the very beginning."

SEA ANEMONES IN AQUARIA.—Our treatment of *Tealia crassicornis* was of the simplest, as the specimen we kept for the unusual length of three years was merely placed in the aquarium with the rest of the anemones, occasionally fed with a bit of raw meat or mussel, and the tank frequently syringed. If "W. H. C." could succeed in finding one on a separate stone, or in knocking off a piece of the stone with

chisel and hammer he would insure its base being uninjured. I found some magnificent specimens at Scarborough last summer, and perhaps some of your readers can inform me whether cats are partial to such things, for I brought them home, and one night, thinking they would be benefited by a "low tide," I placed two (one was a splendid fellow, the size of a small plate) on a pane of glass on the floor. The next morning every trace of them had vanished. Our cat was *believed* to be out all night, but this is not positively known. Has any one ever heard of cat or dog eating a sea anemone? It may interest some collectors to know that I succeeded in getting about twelve varieties at Biarritz this spring; and, what is perhaps more wonderful, they nearly all reached England alive, and are even now in first-rate condition. When it is considered that the unhappy creatures made a tour of ten days with us after leaving the seaside, and had to endure a daily packing and unpacking, spending a few hours in a tin box, and at night placed in a basin and just covered with a little water carried with us in a bottle, their constitutions cannot be called delicate, especially as the last journey was taken in a paper bag! One bay at Biarritz was perfectly carpeted with the lovely *Anthea cereus* of every hue, and it was a matter of difficulty to walk; but in spite of all our exertions, we never could get them to live two days. I know not why. We also found a beautiful specimen of the Holothuria or sea cucumber, and of a tiny bright blue and orange snail-like creature, which the sailors said was a sea-leech. Are these rare? We could not bring them with us to England for want of space. I would only add *in re Tealia crassicornis*, that unless the tank is a large one, a single specimen is enough to keep.—*C. E. R.*

METROPOLITAN SCIENTIFIC ASSOCIATION.—The twelfth session of this society was commenced on October 22, when the president delivered the usual introductory address to an appreciative audience. The president mainly confined himself to the subject of Light and its analysis, and gave an exposition of the successive advances made in this branch of research from the earliest to the more recent times. On concluding, a cordial vote of thanks was passed, and an adjournment made to November 26, when Mr. A. P. Holden read a paper on "The Sun-spot Cycle in relation to Magnetic and other Disturbances." The M. S. A., which was established as long ago as 1866, has steadily progressed to the present time, when it is now permanently settled in the city. Meetings are held the third Tuesday in each month at the ward schools, Aldersgate Street, E.C., and the society invite visitors to any of these meetings. Mr. C. Judd, A.K.C., F.R.A.S., is president, and Mr. W. West, of 9 Ackerman Road, Brixton, S.W., honorary secretary. Amongst the other officers are many well-known microscopists, whose papers have appeared several times in our columns.

CORNUS SANGUINEA.—Owing to the warmth and moisture of the few weeks in the beginning of winter which produced almost the conditions of a second summer, the *Cornus sanguinea* of this neighbourhood came out into full blossom for a second time last year. The flowers which are on last season's wood were in no way different from those that blossomed on the same plants last June and July. Is this unusual?—*J. S., Luton.*

STARLINGS AND LARKS.—The starling has often been held up as a bird of immaculate character. I am therefore sorry to state that I have last season observed him plundering red currants as diligently as his neighbours, the blackbird and the thrush. He has also a taste for cherries. Still the benefits which he confers are vastly greater than the injury which he occasions, and I much regret that, to please such sapient bodies as the London gun clubs, he has been excluded from the protection—such as it is—of the Wild Birds' Preservation Act. The skylark is also a corn-eater. I have seen him distinctly at a very short distance hard at work in an experimental plot of wheat. It is remarkable, as a proof of the intelligence of birds, how soon they detect the harmlessness of a scarecrow, and how often such devices have to be changed if they are really to protect fruit or grain. The gardener in charge of the experimental plots above-mentioned tells me that nothing is of much use for more than two days.—*J. W. Slater.*

SEA ANEMONES.—In answer to your correspondent's ("C. E. R.") queries respecting sea anemones, I have no special treatment for *Bunodes gemmacea;* I have also found them very difficult to keep. The two I now possess have been in my tank nearly two years, and are the survivors of five I had from Torquay (one being the parent of the young ones mentioned in my notes on page 191); the other three dwindled away, as described by "C. E. R." at periods varying from three weeks to six months. With reference to feeding the young ones (which I do once a week), I found it a very difficult matter at first, but it is to be managed with patience and care. The method I adopt is as follows. I remove the young "ferns" into an old-fashioned wine-cooler holding about a quart of water, and keep them in a quiet place, where they get a tolerable amount of light; visit them several times on feeding days, and when I find any of them open, I drop a *very small* piece of mussel into the water and guide it gently with a thin piece of stick until it drops on the expanded disk, when it is soon devoured; if the first piece happens to miss the disk, I try a second or third, and so on until all are fed, when I syringe the water, which brings the pieces not eaten to the surface, and they are then easily removed. I find, after a few weeks of this treatment, the young ones feed readily off a stick the same as the full-grown ones, and I then put them back into the tank. I have also reared *B. gemmacea* and *S. bellis* in one of my aquaria, which is a *glass* fern *dish* (16 in. diameter), having a rim about 1½ inches from the top, on which rim I place the young anemones, where they are easily fed with a stick, being only just covered with water. I have now in my tank several young *S. miniata* and *Dianthus plumosus*, produced by spontaneous division, in a very flourishing condition. —*C. A. Grimes, Dover.*

A WHITE ROOK.—While walking in the neighbourhood of Dursley, in October, I noticed, at a distance of a quarter of a mile or more, a white bird walking in a ploughed field among a large number of rooks. Taking it to be a sea-gull, I approached the field, and found that the bird in question was a rook without a single dark mark on any part of its plumage, as far as I could discern at about a gunshot off.—*C. W. Carrington.*

TESTACELLA HALIOTIDEA, &c. IN NOTTS.—Perhaps it may interest the readers of SCIENCE-GOSSIP to know that *Testacella haliotidea* has been taken in this county. I have taken four specimens, and seen others, from which I conclude it has established itself here. I believe, from inquiries I have made, that this is the first time this species has been recorded from Notts, if not as far north as here; and probably it has been introduced with herbaceous plants at some time. Mr. Tate, in his "Land and Freshwater Mollusks of Great Britain," says: "This species is found in

kitchen and market gardens around London, Norwich, Gloucester, Taunton, Bristol, and in several localities in Devonshire, Tenby, and in the Channel Islands"; and Mr. Jeffrey's localities are much the same. I think it not improbable that this, like some other introduced species, will become more widely distributed throughout the country, as it seems to be gradually gaining ground, and its principal food is so universally distributed. The first specimen I discovered was devouring a large earthworm, and when I took it in my hand, it did not relax its hold. A few other somewhat rare shells were found by Mr. Musson, the secretary of the Nottingham Naturalists' Society, and myself a short time ago; we spent a day collecting on the Notts side of Pleasley Vale, near Mansfield, and another on the same side of Creswell Crags, of geological fame. In the former place, amongst numbers of commoner species, we found a few *Cochlicopa tridens* (*Azeca tridens* of Tate), one specimen of *Clausilia laminata* (dead), and several of *Helix lapicida*, in the same condition, but a living one we could not find. However, in the latter place we found one, but only one, alive; a long search rewarding us with about half-a-dozen more dead ones. I believe these, or part of them, are additions to the Notts fauna. In the afternoon we spent some time in one of the caves, known as "Mother Grundy's Parlour"; and besides a number of pieces of bone, we found three canine teeth of the hyæna, and a molar tooth of some animal we could not determine. Since then I have found one specimen of *Limax brunneus*, a somewhat rare species, according to Tate, but it has a very distinct appearance, although so small. I think Notts will bear a much closer investigation than it has at present received, at least the northern part of it; and, doubtless, other species would be brought to light. The list of mollusca found in the county at present is about eighty; and probably a list may be prepared before long.—*R. A. Rolfe, Welbeck, Worksop.*

MODERN ZOOLOGY.—Some few weeks there appeared in one of the daily papers a prolonged correspondence on the sanitary value of the Eucalyptus, which ultimately degenerated into a discussion on the grammatical accuracy of scientific nomenclature. One of the writers, speaking of an opponent, asked, "Does he not know that the scientific names of the lion, dog, and panther respectively are *Felis leo*, *Felis canis*, and *Felis pardus*?" *Felis canis* the scientific name for the dog! I waited, expecting that a blunder so gross would be at once pointed out by some of the disputants, but no notice was taken. Is not this a striking proof of the great ignorance of biology which exists among the "intelligent and educated classes"? —*S.*

DEPTFORD PINK.—It may interest your readers to know that a fine specimen of the Deptford pink (*Dianthus Armeria*) was found in the parish of Creeting, near Needham Market, Suffolk, last summer.—*T. E. L., Creeting.*

BLACKBIRD AND THRUSH.—Mr. Kerr, in his article on the *Turdus viscivorus*, says that I have fallen into a singular mistake, and that the eggs with *claret markings* were undoubtedly those of the missel thrush. First, the eggs I saw were pale blue, speckled like a blackbird's and spotted with the deep claret markings of a song thrush as well. If the claret spots could have been rubbed out, the eggs would have been like handsome specimens of the *T. merula*. Now the eggs of the *T. viscivorus* are invariably either of purplish-white or very palest sea-green ground with surface spots and blotches of reddish-brown and underlying markings of faded purple. In eight or nine nesting seasons I have not seen one egg with "deep claret markings"; also the eggs of *T. viscivorus* are considerably larger than those of *T. merula*. Mr. Kerr also says I must have mistaken the bird I saw (*T. musicus*) for *T. viscivorus*. Well, the size of the latter (as he says himself) is quite a sufficient distinction, irrespective of the different and deeper brown of the former; and as I saw the bird within a few feet of me, both sitting and flying round me, I could not have made the mistake he thinks I have. Now if I had been mistaken (and I am quite sure I was not), the circumstance would not be the less peculiar, for, instead of *T. musicus*, *T. viscivorus* would have been mating with *T. merula*, for I saw (as I stated) *T. musicus* and *T. merula* together. Again, as to the nest, I confess I was much at fault for not describing it. The outside was rather roughly constructed of mosses interwoven with grasses, and the lining was grass cemented with mud. Also, as Mr. Kerr says, the missel thrush is an early breeder, builds high, and prefers the fork of a tree for the site of its nest. Now this was in the middle of April; the nest was not above 6 feet from the ground, and was built in a hedge, and there are plenty of trees all round in which it (if it had been a missel thrush) would certainly have preferred to build. He also says no instance has been known of a hybrid between *T. musicus* and *T. merula*. Since my first notice, I see that Mr. Dresser, in his "Birds of Europe," mentions two or three instances: one on the authority of Count Salvadori, another on that of Mr. Wier, one of Macgillivray's able correspondents. He also says there is a hybrid in the British Museum. I think that Mr. Kerr has not carefully read my notice, or he would have seen that I did not take *one* egg, but rather intimated the reverse. At the same time I must not close without thanking him for kindly asking me to send him an egg for identification; but I was not in any doubt as to what the eggs were, and having a considerable number and not too much room, I never take one unless I absolutely want it.—*G. T. B.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

S. M.—Send us the papers you enumerated.

W. RICHARDSON.—You will find our answer to your query as to "fins" in your specimen of trilobite in the September number of SCIENCE-GOSSIP, 1878.

J. R. NER .—The following are good *practical* students' books on geology:—"Geology," by J. Clifton Ward; "Field Geology," by W. H. Penning (in both of these you get instructions as to mapping, &c.); Woodward's "Geology of England and Wales," and Kinahan's "Geology of Ireland." Richardson's is too old now. The second edition of Hooker's "Student's Flora of the British Islands" gives the critical species of British plants.

RITA V.—Your specimens are:—No. 1. *Carduus pratensis*, Huds.; No. 2. Restharrow (*Ononis spinosa*, L.); No. 3. Knapweed (*Centaurea nigra*).

W. L. B. (Pulborough).—A reply will be sent per post.

E. F. C. (Leicester).—First, names of plants, kindly sent for identification, are as follows:—No. 1. A variety of *Geranium pusillum*; No. 2. *Myriophyllum verticillatum*, L.; No. 3. *Ranunculus pseudofluitans*, N.; No. 4. *Ranunculus Lenormandi*; No. 5. *Ranunculus trichophyllus*, Chaix; No. 6. *Ranunculus floribundus*, Bab.; No. 7. *Callitriche pedunculata*, D. C.; No. 8. *Potamogeton gramineus* (?); No. 9. *Juncus* (?); No. 10. *Juncus bufonius*; No. 11. *Œnanthe fluviatilis*, Col. (?), *not perfect* specimen; No. 12. *Chara flexilis*; No. 13. *Galeopsis versicolor*; No. 14. *Trifolium medium*; No. 15. *Plum-*

bago Coronopus, L.; No. 16. *Polygonum* (Could you send another specimen of this species?); No. 17. *Glyceria fluitans*, Sm. *Campanula patula alba*, is far from common anywhere. *Plumbago lacustris* (Yes).

J. A. (Coventry).—Hooker and Arnott's "Flora" is superseded by Hooker's "Student's Flora"; by all means secure this.

R. A. B. (Glasgow).—Your specimens are:—No. 1. *Equisetum Telmateia*; No. 2. *Hieracium alpinum*, L.; No. 3. *Briza media*, L.; No. 4. *Poa alpina*; No. 5. *Festuca ovina* (?); No. 4 was a curious viviparous specimen.

J. Finnemore (Truro).—Smith's "Synopsis of the British Diatomaceæ" is now a very scarce book. We received a catalogue from a Berlin bookseller who has a copy; the price is 92 marks, and Mr. Finnemore should make immediate application. This is the only complete work on the subject, but as it has been published nearly twenty-five years, the number of species have since been trebled. O'Meara's "Irish Diatoms," the first part of which was published above three years since, is useful; a copy may perhaps be obtained of the author, the Rev. E. O'Meara, Newcastle Rectory, Hazlehatch, Dublin. All other information is scattered through the "Transactions" of the Royal Microscopical Society, Quekett Club, Linnean Society, "Annals of Natural History," "Quarterly Journal of Microscopical Science," &c. The address of the German bookseller is R. Friedländer & Sohn, 11 Carlstrasse, Berlin, N.W.

J. A. Kay.—It is impossible to name your species of diatom from your rough sketch, and absence of description as to markings, size, habitat, &c. There are about fifty species of Navicula, of which it is one.

The Botanical Exchange Club.—To save personal applications and inquiries, we beg to state that the parcels of return plants are being rapidly made up, and all subscribers who have not received them will receive them in a few days.

J. H. M.—Your specimen is a Sisymbrium; we should not like to speak positively as to species, though it may prove to be *S. Irio*.

W. R. Wells.—It is a somewhat thankless task to have to name an entomological specimen from a worn wing. But your moth appears to be *Bryophila glandifera*, a rather uncommon species.

EXCHANGES.

For half-ounce sand containing foraminifera (fossil) send good foraminiferous or diatomaceous material, or two stamps, to Geo. Clinch, Hayes, Kent.

Wanted, European Anodons and Unios in exchange for fine eocene fossils (British) or for N. American L. & F. W. shells, including many species of *Anodon* and *Unio*.—G. Sherriff Tye, 62 Villa Road, Handsworth, Birmingham.

Offered *Colias edusa* and other lepidoptera or birds' eggs for specimens of *Leucophasia sinapis*.—Herbert Ellis Norris, St. Ives, Hunts.

In exchange for books or natural history objects, the fine cast of a saurian from Lyme Regis, size 12 × 28. The matrix is the colour of lias shale and the bones coloured in imitation of the original, which is in Jermyn Street Museum.—Address T. C. Maggs, Yeovil.

Wanted, any of the following in exchange for twenty-eight parts of Sowerby's "English Botany"; Rossmässler's "Iconography," 3 vols., coloured plates; Jeffrey's "British Conchology," 5 vols., coloured plates; or an equal number of parts of the "Journal de Conchyliologie."—J. D. Butterell, 26 Coltman Street, Hull.

Ichthyology.—Any reader of Science-Gossip requiring any specimens (in spirits) for anatomy and other purposes who will write to me with a view to exchange can obtain a number of species according to the time of the year. Address, first instance, Alpha, care of A. Reynolds, 58 New North Road, London, N.

Prepared slides of fossil wood from South Wales coal measures in exchange for other objects of interest.—W. H. Harris, 44 Partridge Road, Cardiff.

Polyzoa, fossil or recent, for exchange.—C. F. Ogilvie, Sizewell House, Leiston, Suffolk.

Nine good slides for polariser offered for Science-Gossip for 1870, unbound. Have a very large quantity of foraminiferous sand from sponge, and will send on receipt of stamped and addressed envelope, W. Wise, Broad Street, Launceston.

Will give well-mounted slides in exchange for good ½ or ⅓ objective. Send description of objective, and I will send list of slides.—J. Horn, 5 Belle Vue Square, Scarborough.

Wanted, "Monograph of British Graphideæ," by Rev. W. A. Leighton, B.A., or, Mudd's "Manual of British Lichens," 1861. Microscopic slides of lichen spores, &c. or other books in exchange.—Rev. W. Johnson, 19 Union Lane, Gateshead-on-Tyne.

Science-Gossip, 1873 (in fair condition, unbound), in exchange for fossils; or what offers?—W. H. B., 1 Percival Street, Longsight, Manchester.

American, African, Bermuda, European, British eggs, side-blown, authenticated, many rarities: Eleonora falcon, Rufus swallow, rock-thrush, *Turdus cyaneus*, Alpine chough, Cinereus vulture, Lesser cormorants, imperial eagle, &c., in exchange for others.—Sissons, Sharrow, Sheffield.

Slides of butterfly scales, garden white, small and large heath and common blue, for other slides.—W. R. W., 20 London Road, Carlisle.

British birds' eggs, side-blown, picked, labelled; well-marked specimens. List free. Also complete collection of British coleoptera, male and female specimen of every known British variety; 8000 specimens, artistically mounted on cardboard, without pins (new style); correctly named. Particulars sent. Exchange arranged by letter. Foreign correspondence solicited. —Henry Sissons, Westbourne Road, Sheffield.

Wanted, Science-Gossip for 1873, bound or loose. Must be in good condition. Will give well-mounted micro slides or cash.—F. Kellow, 94 Long Acre, W. C., London.

Offered, Scottish fossils and American lepidoptera. Wanted, fossils, brachiopoda, or fish-remains preferred.—T. Stock, 16 Colville Place, Edinburgh.

Well-mounted slides for exchange, including good foraminifera, animal hairs, &c.—J. Ford, Wood View, New Bridge Crescent, Wolverhampton.

For section of clematis, send well-mounted slide to Thomas Shipton, The Terrace, Chesterfield.

Side-blown eggs for exchange (mute swan, carrion crow, magpie, sedge warbler, pied wagtail, and others).—James Ingleby, Eavestone, near Ripon.

In duplicate, about 100 different species of the British land and fresh-water shells, including well-authenticated examples of *Vertigo minutissima*, *V. alpestris*, *V. pusilla*, *V. substriata*, *F. angustior*, *Limnæa involuta*, *Succinea oblonga*. Desiderata; Good foreign land shells, Helices, Bulimi, Achatina, &c.; also *Pisidium roseum*, *P. obtusale*, *L. Burnetti*, *Pupa ringens*.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

Science-Gossip from January 1874 to December 1878, inclusive (three numbers missing); also "Nature" for 1876 (one part missing); both unbound, in good order. For objects, &c., or a parrot, or anything useful. Please send offers.—J. J. Macintosh, 47 Aylmer Street, Montreal, Canada.

I have about a dozen splendid exotic butterflies, also many other natural history specimens, for disposal or exchange. Send for list.—"Science," 165 White Ladies Road, Bristol.

Ianthina communis (small), in exchange for *Isocardia Cor*, *Cytherea chione*, *Scalaria Turtonis*, or other rare marine slides. —J. W. D. Keogh, 25 Camperdown Place, Great Yarmouth.

Offered, infusoria, entomostraceans, crustaceans, isopod crustaceans, rotifers, sponges in spirit, fresh-water polypes, scales of young crocodile, sea-urchins, and spines and pedicellariæ of sea-urchin and starfish, for specimens of small vertebrate animals or bones of such.—Leo. 144 Finborough Road, Earl's Court, S.W., London.

North of Ireland beach and estuarine clay floatings and chalk flint powder, each rich in foraminifera, for good geological or microscopic objects.—Wm. Gray, Mount Charles, Belfast.

Slides of diatoms, hoofs, horns of animals, &c., well-mounted, for other well-mounted objects.—H. B. Thomas, 34 Montpelier Street, Montpelier Square, S.W., London.

Quantity of first-class micro slides of general interest well-mounted, and large assortment of unmounted material. Wanted magic lantern, 3½-inch condenser and slides; photo apparatus, &c. All letters answered.—T. M'Gann, Burren, county Clare.

BOOKS, ETC., RECEIVED.

"Ramsay's Physical Geology and Geography of Great Britain." Fifth edition. London: E. Stanford, Charing Cross.

"Flowers and their Unbidden Guests." By Professor Kirner. Translated by Dr. Ogle. London: Kegan Paul & Co.

"Wild Sports and Natural History in the Highlands." By C. St. John. London: John Murray.

"Six Months in Ascension." By Mrs. Gill. London: John Murray.

"South-Western Pennsylvania in Song and Story." By Frank Cowan, Greensbury, Pa.

"Proceedings of the Natural History Society of Glasgow. Vol. iii. part iii.

"Science pour Tous."

"Feuille des Jeunes Naturalistes."

"Canadian Entomologist."

"American Naturalist."

"Midland Naturalist."

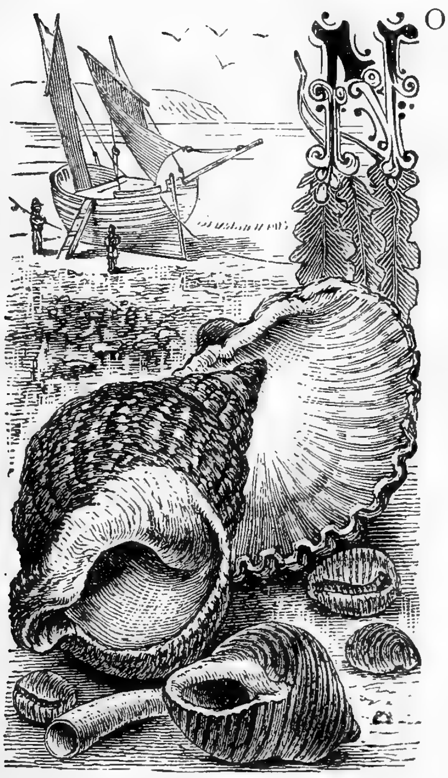
"Land and Water."

"Chambers's Journal."

&c. &c. &c.

Communications received up to 10th ult. from:— T. S.—R. D.—W. G. S.—H. L.—J. H.—G. H.—E. S.—R. M. —E. C.—Dr. G. H. H.—L. C.—Dr. A. G. S. T.—S. M.—Dr. A. M. McA.—J. B. E.—S. B.—J. G.—S. G.—A. S.—H. B.— A. H. S. W.—R. G.—Dr. H. F. P.—Professor B.—J. A. S.— C. E. R.—W. H. H.—E. M.—V. C.—F. C.—E. H. R.—J. D.— W. J.—A. W.—H. E. W.—J. D. B.—F. C. M.—J. W. B.— H. E. N.—J. A. W.—G. C.—B. L. M.—M. L.—A. C. C.— H. D. B.—J. R. N.—R. W. W.—T. R. J.—H. S.—J. M.W.— T. S. —J. F.—F. T. F.—W. H. B.—W. R. W.—F. C. K.— T. S.—W. S.—F. H. A.—J. I.—J. J. M.—E. T. S.—J. W. D. K. —W. G.—R. S. P.—J. F. R.—J. C.—H. B. T.—W. R. W.— J. W. S.—T. McG.—E. F. C.—&c.

"SCIENCE-GOSSIP" BOTANICAL EXCHANGE CLUB REPORT FOR 1878.



NO fewer than twenty-five working members during the past season have forwarded parcels for exchange. Most of the collections were small, though they were excellently preserved and labelled. We prefer, however, mentioning any novelty (with the locality where it was collected), although we feel bound to give any notes forwarded with the parcels when they are of public interest. Thus, Mr. Cunnack, of Helston, writes :—

"*Lavatera sylvestris :* without doubt wild on Tresco, St. Agnes, and St. Mary's, Scilly Isles, especially on the first-named. *Valerianella carinata :* very plentiful near the town of Helston. *Mentha pubescens*, Willd. : authenticated by Dr. Syme. Plentiful in the corner of a damp meadow near Pengersick Castle, in the parish of Breaze, about five miles west of Helston. *M. sylvestris* is particularly abundant close to it. Two forms of *M. pubescens* were observed, one spicate, the other a subspicate form. *Echium violaceum :* in great plenty in fields near St. Just, West Cornwall, one where potatoes had been planted being full of it, presenting a beautiful appearance. There were thousands of specimens in full flower. There seems no reasonable doubt of its being a native. *Juncus capitatus :* very plentiful this year near Caerthillian Valley, extending to Gue Graze Valley, about a mile and a half distant."

Mr. King, of Edinburgh, also notes :—"*Symphytum tuberosum :* a somewhat local plant in the neighbourhood of Edinburgh, where we gathered the specimens sent on the banks of the Braid Burn. The plant is plentiful on the shady side of the rivulet ; on the opposite bank we saw not a single specimen. On the banks of the Water of Leith, near Bonnington, we have gathered a stray plant, mixed with the butterbur and other coarse plants. *Lolium temulentum*, Linn., is another local species in our neighbourhood, and about Leith, waste ground in proximity to the docks, and adjoining sea-beach, this plant is found less or more for these three years back. In the month of July, I found a single clump on the banks of the Firth of Forth, about one mile west from Granton. The variety *arvense* I have not collected previous to the past summer. *Carex pendula*, Linn. : on the railway bank near Trinity, where I gathered this plant, the soil is poor and wet, the rusty water oozing out in all directions. *This sedge favours a soil containing compounds of iron.*"

Mr. A. Brotherston observes several good things, as follows :—"*Salix Russelliana*, var. : very near, if not quite, *fragilis* on the one hand, to *alba* on the other ; apparently it is a hybrid between these two. The male, which was unknown to Sir J. E. Smith, is not uncommon in this district. *Ranunculus fluitans*, var. *Bachii*, Wirt. : Tweed, near Kelso, and Teviot near Roxburgh Castle, July, 1878. I send a few specimens from four different plants, some of them with well-developed floating leaves. Though perhaps not typical *Bachii*, they are nearest that form."

We were glad to be able to distribute this valuable specimen to all our members. We trust they will study it carefully ; perhaps some of them may be able to note other characteristics. Also, a few carefully selected examples of what we suppose to be *Salix ambigua*, Ehrh., are sent out. Is not *S. ambigua* a variable hybrid betwixt *S. repens* and *S. aurita ?* These specimens are for comparison with others.

Picris hieracioides, var. *arvalis* : Tweedside, near Kelso, June, 1878. Probably introduced with grass seeds. *Carex Watsoni*, Syme : Tweedside, Makerstown, Roxburgh, June, 1878. Plentiful many places on Tweedside, occurring in long narrow beds close to the edge of the river. *Potamogeton pectinatus*, L. : Teviot, near Kelso, Roxburgh, July, 1878. This is a common species on the borders.

Mrs. Edwards finds *Eranthis hyemalis* in a wood at

Subbery, on the borders of Derbyshire, "probably introduced to this locality." Also *Crocus nudiflorus*, from a hilly pasture in the village of Walstanton, Salop. "We have it from several localities this season, in fact from all the neighbouring counties."

Amongst the novelties which will be doubtless highly valued by all our contributors are the following:—*Ruppia spiralis*: Bospham, Sussex. Coll. Rev. F. H. Arnold. *Mentha pubescens*: by a rivulet, Pra Sands, West Cornwall. Coll. W. Curnow. *Thalictrum flexuosum*, Bernh.: cut from plants four to five feet in height, growing in an exposed situation at Bala Lake. Coll. C. Bailey, F.L.S. *Seseli Libanotis*: Cuckmere, near Sleaford, Sussex. Coll. H. E. Wilkinson. *Sarothamnus prostratus*: Lizard Point, Cornwall. Coll. J. Cunnack. *Trifolium Townsendi*: St. Martin's, Scilly Isles. Coll. W. Curnow. *Zostera nana*: river Tamar, East Cornwall. Coll. W. Curnow. *Lavatera arborea*: Tresco, Scilly Isles. Coll. W. Curnow. *Orobanche rubra*, Sm.: Lizard Point. Coll. W. Curnow. *Orobanche amethysta*: St. Mary's, Scilly Isles. Coll. J. Cunnack. *Orobanche amethysta*: St. Ouen's Bay, Jersey. Coll. J. Cosmo Melville, Esq. *Papaver somniferum β. glabrum*: Rosley, Cumberland. Coll. Rev. R. Wood. *Polygonum cognatum*: Westerley Ware, Kew. Coll. T. R. Sim. *Viola permixta*, var. *sepincola*: Merstham, Surrey. Coll. W. H. Beeby. *Cyperus fuscus*, Linn.: Pond-side, Shalford Common, Surrey. Coll. W. H. Beeby. *Potamogeton zosterifolius*: Spondon, Derby. Coll. Rev. W. H. Painter. *Callitriche obtusangula*: Mitcham, Surrey. Coll. A. Bennett, Esq. *Rumex maritimus*: Groby Pool, Leicestershire. Coll. E. F. Cooper. *Triticum acutum*, DC.: Leith, Edinburgh. Coll. D. Douglas. We have sent out a large supply of this species for our friends to compare with other herbaria specimens, the name being somewhat doubtful; many of the examples closely resemble *T. repens*, Linn.

We return our thanks to all members for the excellent manner in which the specimens have been got up. In some instances it is impossible by any other means to secure so valuable a rarity, for example, as the *Cyperus* mentioned above. Our best thanks, and those of the members, are also due to Mr. J. F. Robinson for acting as curator.

"UNGKA," APE OF SUMATRA (*SIMIA SYNDACTYLA*); THE ANATOMY OF ITS LARYNX, ETC.

By Dr. GEORGE BENNETT, F.L.S. &c.

DURING a visit to the Island of Singapore, on the 13th of November, 1830, a male specimen of this interesting animal was presented to me. The animal had been recently brought by a Malay lad from the Menangkabau country, in the interior of Sumatra. The Malays at Singapore called this animal the "ungka"; by Sir Stamford Raffles it has been stated as being called the siamang among the natives; and the ungka ape is described by F. Cuvier as the onko, in his splendid work on the Mammalia. On making inquiry among the Malays at Singapore, they denied this animal being the siamang, at the same time stating that the siamang resembled it in form, but differed in having the eyebrows and hair around the face of a white colour.

The *Simia syndáctyla* is described and figured in Dr. Horsfield's "Zoology of Java;" but the engraving does not give a correct idea of the animal. The following sketches are taken from drawings made by Charles Landseer, Esq., from the original. My specimen was a young male. It is preserved in the collection of the British Museum.

I now proceed to relate the habits of the animal as observed by me on board the ship "Sophia," during the passage to England. The measurement of the animal was as follows:—From the os calcis to the vertex of the head, 2 ft. 4 in.; span of the arms, 4 ft.; length of the arm, from the axilla to the termination of the forefinger, 1 ft. 10½ in.; length of the leg from the groin to the os calcis, 11 in.; length from the xiphoid or ensiform cartilage to the crest of the pubis, 7½ in.

The teeth are twelve in each jaw; four incisors, two canine, and six molars: in the upper jaw the canine were placed widely apart from the last incisor, giving an appearance as if a tooth was deficient: this did not occur in the lower jaw. The teeth of the animal were in very bad condition. The colour of the animal is entirely black, being covered with stiff hair of a beautiful jet black over the whole body; the face has no hair, except on the sides as whiskers, and the hair stands forward from the forehead over the eyes; there is little beard. The skin of the face is black; the arms are very long, the radius and ulna being of greater length than the os humeri; the hair on the arm runs in one direction, viz. downwards, that on the forearm upwards; the hands are long and narrow, fingers long and tapering; thumb short, not reaching farther than the first joint of the forefinger; the palms of the hands and soles of the feet are bare and black; the legs are short in proportion to the arms and body; the feet are long, prehensile, and, when the animal is in a sitting posture (fig. 29), are turned inwards, and the toes are bent. The first and second toes are united (except at the last joint) by a membrane, from which circumstance he has derived his specific name. He invariably walks in the erect posture when on a level surface; and then the arms either hang down, enabling him sometimes to assist himself with his knuckles; or, what is more usual, he keeps his arms uplifted in an erect position, with the hands pendent (fig. 28), ready to seize a rope and climb up on the approach of any danger, or on the intrusion of strangers. He walks rather quickly in the erect posture, but with a waddling gait, and is soon

run down if whilst pursued he has no opportunity of escaping by climbing. On the foot are five toes, the great toe being placed like the thumb of the hand; the form of the foot is somewhat similar to that of the hand, having an equal prehensile power; the great toe has a capability of much extension outwards, which enlarges the surface of the foot when the animal walks; the toes are short, the great toe is the longest. The eyes of the animal are close together, with the irides of a hazel colour: the upper eyelids have lashes, the lower have none: the nose is confluent with the face, except at the nostrils, which are a little elevated; nostrils on each side, and the nose united to the upper lip: the mouth large: ears small, and resembling the human, but without the pendent lobe. He has nails on the fingers and toes; he has two hard tubercles on the tuberosities of the ischium, but is destitute of a tail or even the rudiments of one.

His food is various: he prefers vegetable diet, as rice, plantains, &c., and was ravenously fond of carrots, of which we had some quantity preserved on board. He would drink tea, coffee, and chocolate, but neither wine nor spirits: of animal food he prefers fowl to any other; but a lizard having been caught on board, and placed before him, he took it immediately in his paw, and greedily devoured it.

The first instance I observed of his attachment was soon after the animal had been presented to me by Mr. Boustead. On entering the yard in which he was tied up, one morning, I was not well pleased at observing him busily engaged in removing his belt and cord, at the same time whining and uttering a peculiar squeaking noise. When loose, he walked in the usual erect posture towards some Malays who were standing near the place; and after hugging the legs of several of the party, he went to a Malay lad, climbed upon and hugged him closely, having an expression, in both the look and manner, of gratification at being once again in the arms of him who, I now understood, was his former master. When this lad sold him to Mr. Boustead, whenever the animal could get loose he would make for the water-side, the Malay lad being usually on board the prau in which they had arrived from Sumatra; and the animal was never taken until, having reached the water, he could proceed no farther. On sending him aboard the ship, he on arriving, after rewarding his conductor with a bite, escaped, and ascended the rigging; but towards the evening he came down on the deck and was readily secured.

He is not able to take up small objects with facility, on account of the disproportion of the size of the thumb to the fingers. The metacarpal bone of the thumb has the mobility of a first joint; the form of both the feet and hands gives a great prehensile power, fitted for the woods, where it must be almost impossible to capture an adult animal alive.

Under the throat is a large black pouch, a continuation of the common integument, and very thinly covered with hair: this pouch is not very visible when undistended: it is a thick integument, of a blackish colour and corrugated appearance. It extends from the under part of the chin to the throat, and is attached as low down as the upper part of the sternum, and is also attached above to the symphysis of the lower jaw; its use is not well known, but it is not improbable that it is an appendage to the organ of voice. Sometimes, when irritated, I have observed him inflate the pouch, uttering at the same time a hollow barking noise;* for the production of which, the rushing of the air into the sac was an adjuvant. The inflation of the pouch was not, however, confined to anger; for, when pleased, he would purse the mouth, drive the air with an audible noise into the sac; or when yawning, it was also inflated; and in all instances he would gradually empty the sac, as if he derived a pleasure from it. When the sac has been distended, I have often pressed on it, and forced the air contained within it into the mouth, the animal not evincing at the time any sign of its being an annoyance to him. When uttering the barking noise, the pouch is not inflated to the same extent as when he yawns. It has been stated in an American publication, that the use of the air-sac is for a swimming-bladder. It may be said in refutation (if the assertion is not too absurd to be refuted) that the animal being one day washed in a large tub of water, although much frightened, did not inflate or make the least attempt to inflate the sac. He is destitute of cheek pouches as a reservoir for food.

When sleeping, he lies along either on the side or back, resting the head on the hands, and seemed always desirous of retiring to rest at sunset; but would often (I suppose from his approximation to civilisation) indulge in bed some time after sunrise; and frequently when I awoke I have seen him lying on his back, his long arms stretched out, and, with eyes open, appearing as if buried in deep reflection. The sounds he uttered were various: when pleased at a recognition of his friends, he would utter a peculiar squeaking chirping note; when irritated, a hollow barking noise was produced; but when angry and frightened, or when chastised, the loud guttural sounds of *ra*, *ra*, *ra*, invariably followed. When I approached him for the first time in the morning, he greeted me with his chirping notes, advancing his face at the same time, as if intended for the purpose of salutation. He had a gravity of look and mildness of manner, and was deficient in those mischievous tricks so peculiar to the monkey tribe. In only one instance did I experience any mischief from him, and that was in his meddling with my inkstand: he had a *penchant* for the black fluid, would drink the ink, and suck the pens, whenever an opportunity offered of his gratifying this morbid propensity. He soon knew the name of Ungka, which had been given to him;

* When the barking noise was made, the lips were pursed out, and the air driven into the sac, at the same time that the sound was uttered, the lower jaw was also a little protruded.

and would readily come to those to whom he was attached when called by that name. His temper was mild, and not readily irritated; his mildness of disposition and playfulness of manner made him a universal favourite with all on board.

When he walks in the erect posture, he turns the leg and foot outwards, which occasions him to have a waddling gait and a bow-legged appearance. He would walk the deck, being held by his long arm, and then had a resemblance to a child just learning to walk. He has an awkward manner of drinking, by which the liquid is much wasted: he first applies his lips to the liquid, throwing the head up, which may in some degree be attributed to the prominency of the lower jaw; and if the vessel in which the liquid is contained should be shallow, he dips the paw into it, holds it over the mouth, letting the liquid drop in. I never observed him lap with the tongue when drinking; but when tea or coffee was given to him, the lingual organ was carefully protruded for the purpose of ascertaining its temperature. He usually (on first coming on board), after taking exercise about the rigging, retired to rest at sunset, in the maintop, coming on deck at daylight. This continued until our arrival off the Cape, when, experiencing a lower temperature, he expressed an eager desire to be taken in my arms, and indulged by being permitted to pass the night in my cabin, for which he evinced such a decided partiality, that on the return of warm weather he would not retire to the maintop, but was always eager to pass the night in the cabin.

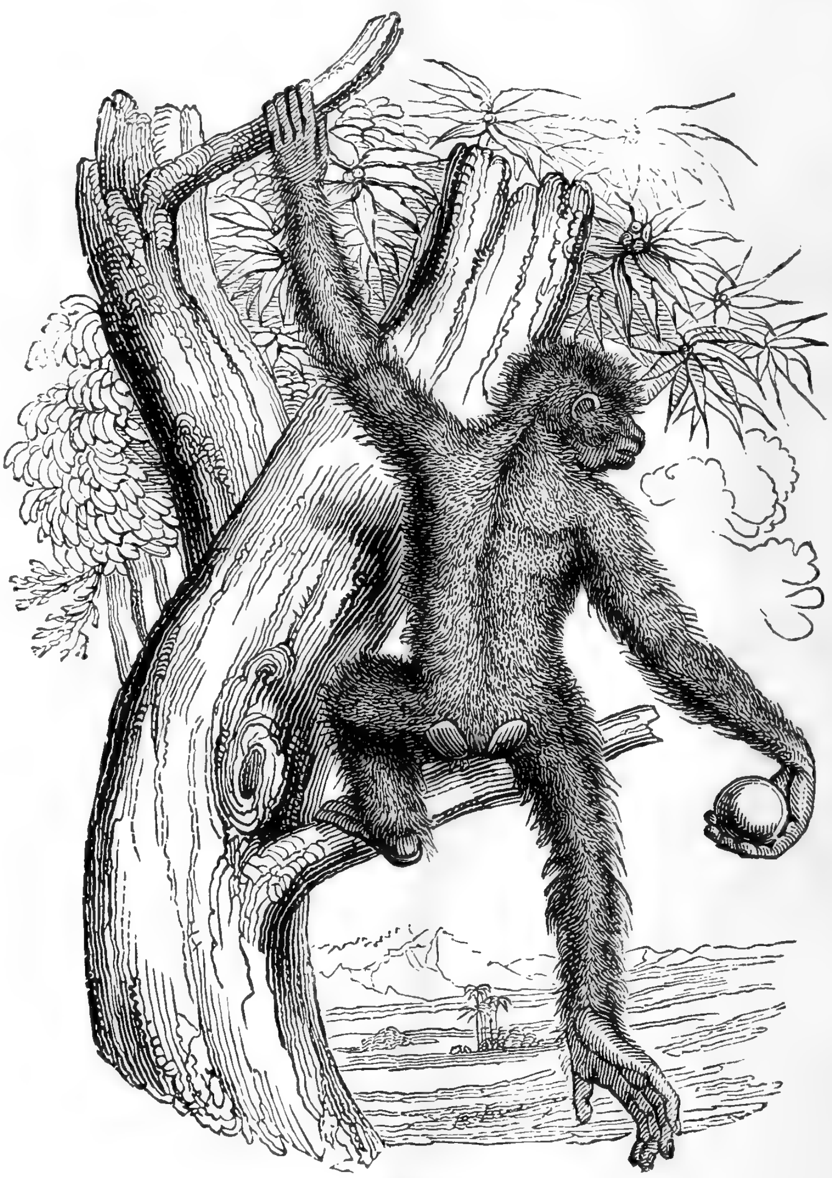


Fig. 27.—The Ungka Ape (*Simia syndáctyla*) at home.

He was playful, but preferred children to adults; he became particularly attached to a little Papuan child who was on board, and who, it is not improbable, he may have in some degree considered as having an affinity to his species. They were often seen sitting near the capstan, the animal with his long paw around her neck, lovingly eating biscuit together. She would lead him about by his long arms; and it was very amusing to see him running round the capstan pursued by or pursuing the child; he would waddle along at a rapid pace, sometimes aiding himself by his knuckles; but, when fatigued, would spring aside, seize a rope, and ascend a short distance, safe from pursuit. In a playful manner he would roll on deck with the child, displaying a mock combat, pushing with his feet (in which action he seems to possess great muscular power), entwining his arms around her, and pretending to bite; or, seizing a rope, he would swing towards her, and, when efforts were made to seize him, would elude the grasp by swinging away; or he would drop suddenly on her from the ropes aloft, and then engage in various playful antics. He would play in a similar manner with adults, but always seemed to have a preference for children. If an attempt was, however, made by the child to play with him when he had no inclination, or after he had sustained some disappointment, he usually made a slight impression with his teeth on her arm, just sufficient to act as a warning that no liberties were to be taken with his person; or as the child would say, "Ungka no like play now." Not unfrequently, a string being tied to his leg, the child would amuse herself by dragging the patient animal about the deck; tired, however, of such practical jokes, without having himself any share in the fun, he endeavoured to disengage himself and retire; on finding his efforts fruitless, he would quietly walk up to the child, make an impression with his teeth on one of the members that were the nearest, soon terminate the sport, and procure his liberty.

There were also on board the ship several small monkeys, with whom Ungka was desirous of forming interesting "conversaziones," to introduce a social character among them, to while away the tedious hours, and to dissipate the monotony of the voyage;

but to this the monkeys would not accede, and they all cordially united to repel the approaches of the "little man in black," by chattering, and sundry other hostile movements peculiar to their race. Ungka, thus repelled in his endeavours to establish a social intercourse, determined to punish them for their impudence; when they again united to repel him, by chattering and divers other impudent tricks, he seized a rope, and, swinging towards the nearest, seized his "caudal appendage," and hauled away upon it, until the agility of the monkey obliged him to relinquish his hold. But it not unfrequently happened that he made his way up the rigging, dragging the monkey by the tail after him, and if he required both hands

Fig. 28.—Ungka Ape in erect position.

to expedite his ascent, the tail of his captive would be passed into the prehensile power of his foot. These ludicrous scenes were performed by Ungka with the most perfect gravity of countenance; having no caudal extremity himself, he knew he was free from any retaliation. As this treatment was far from being amusing to the monkeys, they afterwards either avoided him, or made so formidable a defence on his approach, that Ungka was obliged to refrain from indulging himself in "*tale-bearing*." He had, however, such an inclination to *draw out tails*, that, being obliged from "peculiar circumstances" to relinquish those of the monkeys, he cultivated the friendship of a little pig that ran about the deck, and, taking his tail in his hand, endeavoured, by frequent pulling, to reduce it from a curled to a straight form; but all his efforts were in vain; although piggy did not express any ill-feeling at his kind endeavours. On the dinner being announced by the steward, he invariably entered the cuddy, took his station near the table, and "scraps were thankfully received." If when once at dinner he was laughed at, he vented his indignation at being made the subject of ridicule, by uttering his peculiar hollow barking noise, at the same time inflating the air-sac, and regarding the persons laughing with a most serious look until they had ceased, when he would quietly resume his dinner. He disliked confinement, or being left alone; when shut up, he would display great ebullition of temper, but would be perfectly quiet when released. At sun-

Fig. 29.—Ungka Ape in sitting position.

set when desirous of retiring to rest, he would approach his friends, uttering his peculiar chirping note, beseeching to be taken into their arms: his request once acceded to, any attempt to remove him was followed by violent screams; he clung still closer to the person in whose arms he was lodged, and it was difficult to remove him until he fell asleep. His tailless appearance, when the back is turned towards the spectator, and his erect posture, gives an appearance of a little black hairy man.

The limbs, from their muscular and strong prehensile power, render the animal a fit inhabitant for the forest (fig. 27); enabling him to spring from tree to tree with an agility that we have frequently witnessed him display about the rigging of the ship;

passing down the backstays, sometimes hanging by his hands, at others by walking down them in the erect posture, like a rope-dancer, balancing himself by his long arms; or he would spring from one rope at a great distance to another, or would drop from one above to another below. Being aware of his inability to readily escape pursuit when running on a level surface, his first object, when about to make an attack, was to secure a rope, and swing towards the object he was desirous of attacking; if defeated, he eluded pursuit by climbing out of reach. He was very fond of sweetmeats, dates, &c.; some Manilla sweet cakes that were on board he was always eager to procure, and would not unfrequently enter the cabin in which they were kept, and endeavour to lift the cork of the jar: he was not less fond of onions, although their acridity would cause him to sneeze and loll out his tongue; when he took one he put it in his mouth, and ate it with great rapidity. He could not endure disappointment, and, like the human species, was always better pleased when he had his own way; when refused anything, he would display all the ebullitions of temper of a spoiled child, lie on deck, roll about, throw his arms and legs in various directions, dash everything about that might be within his reach, walk about, repeat the same scene as before, uttering during the time the guttural notes of *ra, ra;* the employment of coercive measures during the paroxysms reduced him in a short period to a system of obedience, and the temper was in some degree checked. He had not an unapt resemblance to a spoiled child, who may justly be defined as papa's pride, mamma's darling, the visitor's terror, and an annoyance to all the living animals, men and maid servants, dogs, cats, &c., in the house that he may be inhabiting.

The position of the feet, when the animal walks, is turned outwards, and the great toe, which has a capability of great extension, is spread out wide, giving a broader surface to the foot; when he walks, to use a nautical phrase, "he sways the body," and stepping at once on the whole of the under surface of the foot, occasions a pattering noise, like that which is heard when a duck or any aquatic bird walks on the deck of a ship.

When the weather is cold, he is seen huddled together, loses all his lively and playful manner, and sleeps much during the day: on the return of warm weather, it imparts life to the animal; his spirits revive, he resumes his gambols and sportive gaiety. Although every kindness was shown to him by the officers and crew, and sweetmeats were given to him by them, he would not permit himself to be taken in the arms, or caressed familiarly by any person on board during the voyage, except the commander, Mr. Hays, the third officer, and myself; all those, in particular, who wore large bushy whiskers he particularly avoided.

When he came at sunset to be taken into my arms, and was refused, he would display a paroxysm of rage, but that being unsuccessful, he would mount the rigging, and hanging over the deck on which I was walking, would suddenly drop himself into my arms. It was ludicrous to behold the terrified looks of the animal, and half-suppressed screams, if his finger was taken towards a cup of hot tea, as if to ascertain its temperature. He would frequently hang from a rope by one arm, and, when in a frolicsome humour, frisk about, shut his eyes, and have a resemblance to a person hanging and in the agonies of death. When strangers came on board, he approached them at such a distance as he considered consistent with his ideas of safety. The only lady who had honoured him with her notice was one who came on board from a ship ("Euphrates") we spoke at sea; he evinced, however, no partiality to the gentle sex, and would not permit her to caress him: whether it was the bonnet, which was *à la mode* of 1828, or other portions of the lady's dress, that excited his indignation, I know not; but he was evidently not eager to become acquainted with her: as she appeared at first timid of approaching the animal, it may in some degree have occasioned the cunning brute to keep up the feeling.

On the 19th of March (1831) we had reached the latitude 45° 41′ N. and longitude 24° 40′ W.; the animal seemed (although clothed in flannel) to suffer much from cold, and he was attacked by dysentery: his attachment was so great, that he would prefer going on the deck, in the cold air, with the persons to whom he was attached, to remaining in the warm cabin with those whom he did not regard. On the 24th he became much worse, his appetite gone, and he had a dislike of being moved; the discharge from the bowels was bilious, mixed with blood and mucus, sometimes entirely of blood and mucus, with a putrescent odour: the breath had a sickly odour, mouth clammy, eyes dull and suffused; drank a little water occasionally, and sometimes a little tea; he generally remained with his head hanging on the breast, and limbs huddled together; he would, however, when yawning, inflate the pouch as usual. On the 29th we had prevailing easterly winds; and he was daily sinking until the 31st of March, when he died, in latitude 48° 36′ N., longitude 9° 1′ W.

On examination, the thoracic viscera were healthy; the spleen was healthy, of small size, and lobulated at one extremity; the liver was large and healthy, the difference in size between that organ and the spleen was considerable in comparison with the relative proportions of those organs in the human subject; the gall bladder contained a small quantity of dark, thick, and viscid bile; some of the mesenteric glands were enlarged, some being of a white, others of a dark colour. On laying open the duodenum, it was found to contain a quantity of mucus slightly tinged with bile; the colon and cæcum were full of liquid bilious fæces mixed with mucus, and several ulcerated patches

on the inner surface, and a dark spotted appearance at others; the rectum also contained similar fæces, but mixed with a curdy matter, and there were several large patches of ulceration on the inner coat, more particularly near the termination of the gut: the kidneys were healthy, on the right the capsula renalis was large, but none was visible on the left; the bladder was quite empty, the inner surface scarcely moist. The animal had been castrated, but the spermatic cord terminated in the scrotum in two small oval substances, rather larger than peas; the sacrum and os coccygis were similar to those parts in the human subject. The communication of the larynx was examined; the epiglottis was only indicated by a slight obtuse angular rising; the sacculi laryngis three-eighths of an inch in the long diameter, one-eighth in the short; their margins were well defined, continued forwards below the body of the os hyoides into a membranous sac situated internal to the external thick one. This animal has one common sac, and thus differs from the orang-utan, which has two; the lungs also differ from those in the orang-utan in being subdivided on each side, the right lung having three, the left two lobes, as in the human subject. The extremities of the bones of the animal were cartilaginous.

When at Achua, on the coast of Sumatra, the Rajah and suite came on board, and I amused them with some drawings, among others they recognised that of the Pearly Nautilus, but said it was seldom procured at this place, but was occasionally seen off the coast. They were not acquainted with the orang-utan of which I showed them the engraving in Abel's "China," but immediately recognised that of the ungka gibbon, which, they stated, was found in the forests of the interior of the island, but was very difficult to capture alive. As mentioned by the Rajah there must be great difficulty in procuring them alive, as since the one given me at Singapore, I am not aware of any specimen, young or adult, of this species of gibbon having ever been brought alive to Europe.

THE IVORY-NUT PALM.

IN 1843 Mr. William Purdie was despatched to New Granada to collect plants for the Royal Gardens, Kew. He was especially instructed to find a few special plants, one of which was the ivory-nut palm, of which he says:—"In a journey of 600 miles from Santa Martha to Ocana in New Granada, at the village of Semana, seventeen leagues from hence (Ocana), and near the great river Magdalena, I entered the mountains by the Paroquia del Carmen, and saw for the first time the ivory-nut palm (*Phytelephas macrocarpa*), called *Tagua* by the natives. The habit of this palm is to have little or no stem, what there is is decumbent; its habit is not robust. Old plants have from fifteen to twenty pinnate leaves, which when full grown measure nearly twenty feet in length, of a delicate pale green colour, and very graceful in aspect; the pinnæ are numerous and linear, the whole leaf being similar to that of the date palm. The male and female flowers are produced on separate plants (diœcious). The female flowers are produced generally in six clusters from the bases of the leaves on short footstalks. The clusters are of an imperfectly rounded form, covered with strong protuberances, about an inch and a half long. The clusters are compactly united together, forming a nearly globose head, and on account of the style-like projections resembling the rigid hair of a negro it is not inaptly called *Cabeza del Negro* (negro's head). The heads lie close to the ground, each cluster containing four to five seeds. The seed contains at first a clear insipid fluid; it afterwards becomes milky and sweet, and ultimately hardens, and becomes the vegetable ivory of commerce. Each nut is about the size of a green walnut, and is covered with a yellow, sweet, oily pulp, which is collected and sold under the name of Pepo del Tagua, for one real (6*d.*) a pound at Ocana. A spoonful of it, with a little sugar and water, makes the celebrated Chiche de Tagua, said to be the most delicious beverage of the country."

The stem of the male plant is longer and more erect than that of the female, regarding which Mr. Purdie says: "I have at last had the good fortune to detect the male flowers of the ivory-nut palm, for which I long sought in vain. The singularity of its inflorescence is only equalled by its beauty. It differs from most other palms by having a double spathe; the central column is thickly set with clusters of male blossoms, and forms, when taken all together, a mass three feet long and four inches thick. Half is concealed within the spathe, from which the other portion projects in a gracefully recurved form. The fragrance is most powerful and delicious, beyond that of any other plant, and so diffusive that the air for many yards around was alive with myriads of annoying insects, which first attracted my attention, the denseness of the vegetation not permitting me to discern the blossoms at any distance. I had afterwards to carry it in my hands for twelve miles, and though I killed a number of insects that followed me, the next day a great many still hovered about it, which had come from the wood where it grew, which are dense and shady, and abound with snakes. The men I had with me found it necessary to dislodge them from the plants with a long stick before they approached them. We killed several, not particularly formidable in appearance, but deadly in their nature. A cross, decorated with flowers and a few loose stones, near one of the Tagua woods, marks the grave of a young man who died a few hours after being bitten by one of these snakes."

Mr. Purdie having sent abundance of seeds to Kew, many plants were raised, one of which in 1864 had

formed a decumbent stem about a foot in length, producing leaves 15 to 16 feet long.

Dr. Berthold Seemann, also a botanical collector for Kew, found the Phytelephas in abundance in Darien; he gives a very interesting account of it, which in all principal points agrees with the above.

J. Sm.

HINTS FOR THE YOUNG MICROSCOPIST.

It has often occurred to the writer of these few lines that it is a pity that so many practical dodges as must have been adopted by various microscopical manipulators should be lost, as it is to be feared they have been from time to time. Unless called out by queries, they seldom appear in the form of suggestions. Acting under this impression, the writer is led to call attention to two or three little arrangements which he has found very useful, hoping that others will follow the example.

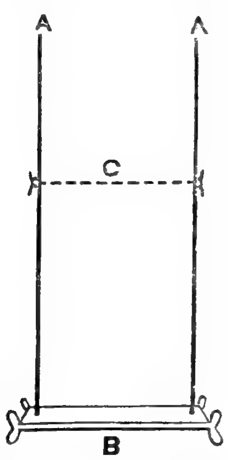


Fig. 30.—Brass stand to support the forehead whilst making microscopical drawings.

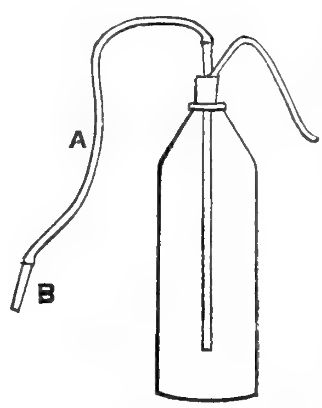


Fig. 31.—Improved wash-bottle.

In making drawings of objects seen under the microscope (for which purpose no apparatus is so satisfactory and easy to use as Natchet's prism or camera), most persons must be conscious that a steady *head* is as requisite as a steady hand. To insure this, a very simple plan (fig. 30) has been adopted for a long time by the writer. It is this:—two thin stair-rods (A, A) of any convenient length are fastened by one end into a stand of brass or wood (B), and just as far apart as to admit the head between them. Then there is a sliding flat bar (C), which can be screwed tight at any height. Round this is wrapped any soft substance, as lint or list, on which the forehead is placed just in the position desired. A steadiness and comfort are thus at once obtained which greatly assist the draughtsman.

Again, in using the wash-bottle the following little alteration will be found most convenient. (Fig. 31.) In place of having two glass tubes, one of which is placed in the mouth, let this mouth-tube be broken off an inch or two above the cork, and upon it fit an elastic indiarubber tube (A) of any convenient length, say nine inches; then a couple of inches of glass tube put into the free end (B) makes a nice mouthpiece. The advantage is obvious, as this plan allows the head to be moved nearer to or farther from the object without interfering with the position of the bottle. This has been used by the writer for many years.

Other suggestions may follow if it is thought desirable.

Codicote Vicarage. T. R. I.

THE BOULDER CLAY OF LEITH.

It may interest your readers to learn something regarding the traces that have been left of the glacial period in this vicinity, which has proved to be a very interesting one in regard to that part of geological history.

Edinburgh is surrounded by an extent of country covered, more or less, with a thick layer of boulder clay. In most of the excavations in and around the city, this is reached after passing through the soil to an average depth of six to seven feet. To the south of the city, away on the first slopes rising towards the Pentland hills, the boulder clay is very thick, and forms a fine basin for the new reservoir in course of construction at Alnwick hill. From that point we can trace the clay to the north, through the Newington district of the town, where I have found it with the usual striated boulders. Passing through the city this deposit disappears on reaching the ridge which goes upwards towards the castle, till we approach Leith Walk, where it is again found. Some cuttings at Pilrig—the border-land between Edinburgh and Leith—have revealed the boulder-clay about seven feet from the surface. It is not, however, till we examine the shore at Leith that we get anything like a good section of it; and here both the mercantile enterprise of that town and the denuding power of the ocean, have come to our aid. As a result of the latter, the banks which rise against the sea between Leith and Portobello, are gradually giving way and receding, revealing the tough boulder clay, which seems to die hard in its battle with the sea.

When the boulders are found *in situ*, they are almost invariably lying with their longer axis from W. S. W. to E. N. E., and are striated in the same direction. This agrees with the striæ in Arthur's Seat, a hill rising to the east of Edinburgh and about two miles from the coast. I have found those boulders all along the coast from Cramond to Joppa, a distance of nine miles, but they are best seen between Leith and Portobello, where they lie thickly and where many of them have beautifully marked striæ. The ground here has been rendered geologically classic by the writings of Dr. Robert Chambers and Hugh Miller; the former however, attributing the phenomena in question to the agency of the sea

during the various changes of its level, while Miller detected in them the signs of a power now foreign to this country. When Miller worked here, the boulder clay was not so well exposed as it is now, and the examination is thus rendered much easier. Owing to the increase of trade at Leith, a new and very large dock is being constructed to the east of the town. In order to get a sufficient depth of water the sea bottom has been excavated, and this has laid open fine sections of the various deposits which have accumulated there.

The boulders are generally of greenstone; and seem to have been carried from Arthur's Seat and the Corstorphine hill, some distance inland. So far I have not observed any of the west country rocks enclosed in the clay; but do not doubt that this is the track of the great glacier which, according to Geikie, had its origin away in the western highlands.

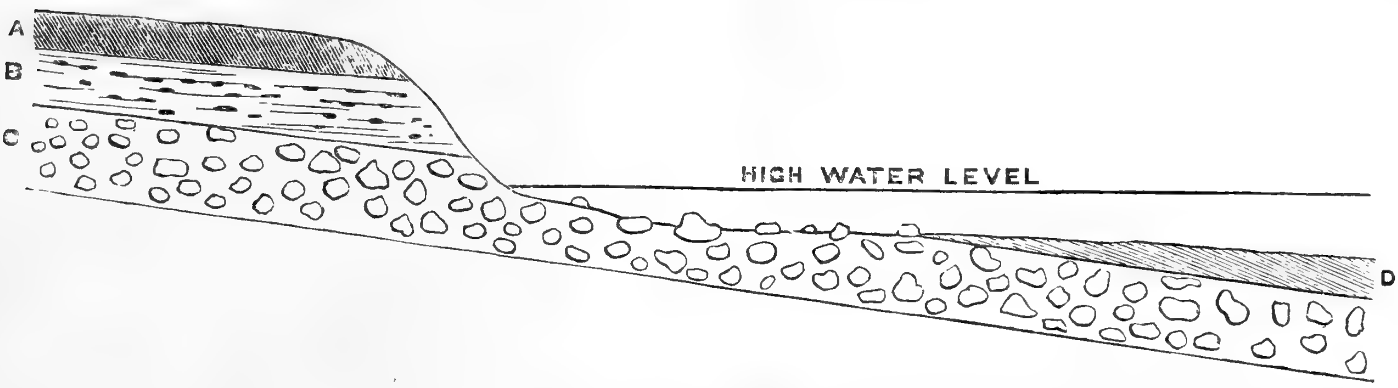


Fig. 32.—Section showing the boulder clay, &c. near Leith. A, surface soil; B, old sea-bed, with gravel layers; C, boulder clay; D, present sea-bed.

Since the deposition of the boulder-clay in this locality, the relative position of sea and land seems to have changed twice. The following diagram shows this; and also gives a general idea of the position of the deposit at Leith. On the top of the clay is found a thick layer of sand and pebbles, giving unmistakable proofs of marine origin, by the stratified order of the latter; while the boulder clay is once more raised above the bed of the ocean. A few hundred yards from the beach, the boulder clay disappears on account of the slight incline it takes towards the sea, and unless this is noticed, the sudden freeness of the shore from boulders is apt to confuse the geologist.

ROBERT HUMPHREY.

THE CRITICAL BOTANIST.

[THE HISTORY OF BOTANY.]

THE experience of recent years has clearly shown the great value of a historical or chronological method of research in nearly every branch of science. It may be well, therefore, in taking my own study of the genus Thalictrum as an example of critical method to give in considerable detail the materials as I have collected them. Every study must have a beginning, but many errors of interpretation will undoubtedly be made by one, who attempts for the first time, to track the knowledge of early botanists on any point, without some general knowledge of the subject-matter, *i.e.*, of the plants themselves. I propose making the British forms of Thalictrum the most prominent subject of my present investigation.

British botanists are looking forward with interest to the Guide to the Literature of Botany promised by the Index Society from the pen of Mr. B. Daydon Jackson, the accomplished editor of Turner's "Libellus" and Gerard's "Catalogus;" but, pending any better arrangement, I venture to divide the history of British botany into four periods, the first terminating at the year 1670, the second at about the year 1746, the third at 1829.

Without going back to Solomon, or even to Aristotle and his pupil Theophrastus, who, born B.C. 371, described some 500 plants, classified as trees, herbs, and shrubs, I must just mention the name of Pedanius Dioscorides of Anazarba, in Cilicia, whose Greek work on Materia Medica is believed to have been written in the second century. It seems, however, to have been one of Pliny's main sources of information, and the author of the "Historia Naturalis," born A.D. 23, died in A.D. 79. After the time of Pliny it may truly be said, in the words of M. Crépin's excellent "Guide du Botaniste en Belgique"—a work well meriting an English imitation—"Avant le XVI^e siècle, la botanique ne peut être considérée comme une véritable science. Elle n'était que l'humble auxiliaire de la médecine; les plantes n'étaient pas étudiées pour elles-mêmes et les traités qui les concernaient n'étaient, pour la plupart, que des commentaires des ouvrages de Théophraste, de Dioscoride et de Pline." Though in the sixteenth century the Dutch may fairly claim the credit of possessing the most illustrious names in botanical science, Fusch, Dodoens, and L'Obel, we in England have reason to be proud of the early date (1538) of the first botanical work of "the father of British botany," William Turner. Turner was born probably between 1510 and 1515; his first work was entitled "Libellus de re Herbaria Novus," and has been reproduced in facsimile, and edited by Mr. Jackson; his "Herbal" was completed in 1568, the year of his death. Remacle Fusch, born at Limbourg, about 1500, died at Liége in 1587, his

various works, such as "Plantarum omnium quarum hodie apud pharmacopolas usus est magis frequens nomenclaturæ . . . sententiam," Paris, 1541, being mainly materia medica. Rembert Dodoens was born at Mechlin in 1517, and died at Leyden in 1585. In 1554 he published his "Cruydeboeck," which was translated into French by Clusius in 1557, into English by Henry Lyte in 1578, and into Latin, as the "Stirpium Historiæ Pemptades," by the author in 1583. "La gloire de Dodoens," says Crépin, "est d'avoir rompu avec le passé, d'avoir, dans son histoire des plantes, étudié la nature par lui-même. . . . On peut dire, en toute vérité, que Dodoens est l'inventeur de la classification des plantes." His classification is, however, hardly worthy of the name. Conrad Gesner, born at Zurich in 1516, published a work, "De Raris et Admirandis Herbis," in 1555, but his great work, with figures of 1500 species, was not published when in 1565 he died, and his ideas on classification were carried out by Andreas Cæsalpinus, called by Linnæus "Primus verus systematicus." In his "De Plantis," published at Florence in 1583, he distributes 1520 plants into fifteen classes, his primary division being into trees and herbs, and the secondary ones according to the position of the embryo, and the nature of the fruit and seeds. In 1561 Valerius Cordus published Gesner's "Historia de Plantis," at Strassburg. Matthias de l'Obel, born at Lille in 1538, died at Highgate in 1616. In 1570, in conjunction with Peter Pena, he published in London his "Stirpium Adversaria Nova," and in 1576, at Antwerp, his "Observationes." His works were largely followed by John Gerard (born 1545), who, in 1596 and 1599, published catalogues of the plants growing in his garden, and in 1597 his "Herball." Gerard seems largely indebted to Dodoens, and seems to have little original merit. The "Herball" contains about 2000 plants. In 1601 appeared the "Rariorum Plantarum Historia," the chief work of Charles de l'Escluse, commonly known as Clusius (born 1526, died 1609). It was printed at Antwerp, "par le célèbre Plantin, le généreux Mécène des botanistes." In 1606 and 1616 was published at Rome the "Ecphrasis" of Columna, who alone seems to have appreciated the views of Cæsalpinus; for both Caspar Bauhin, in his "Pinax," in 1623, and his elder brother John, in his "Historia Plantarum Universalis," which describes 5000 species, follow Lobel. Pulteney describes the latter work, published in 1650, as "a repository of all that was valuable in the ancients, in his immediate predecessors, and in the discoveries of his own time, relating to the history of vegetables, executed with that accuracy and critical judgment which can only be exhibited by superior talents." In 1623 Thomas Johnson (died 1644) published his "amended" edition of Gerard's "Herball," which is virtually a new work by an author far more critical than that of the original. A botanist of perhaps still higher calibre was John Parkinson, apothecary of London, and the King's herbarist, born in 1567, who, in 1629, published a horticultural work, "Paradisi in sole Paradisus Terrestris," and in 1640 his "Theatrum Botanicum." The "Phytologia Botanica" of Dr. William How, published in 1650, "The First attempt at a Flora in England," and the "Pinax" of Dr. Christopher Merrett, published in 1666, are surpassed *longo intervallo* by the "Catalogus Plantarum Angliæ" of John Ray, which appeared in 1670.

Whilst the Catalogus opened a new period in British botany, a series of great works marked a fresh era in general botanical classification. These were the "Historia Plantarum Universalis" of Robert Morison, published in 1678, Ray's "Methodus Plantarum" in 1682, Rivinus's "Introductio Generalis in Rem Herbariam," in 1690, and Tournefort's "Elémens de Botanique," in 1694. Robert Morison, a native of Aberdeen, Regius Professor at Oxford, in his history, and in a previous work on the Umbelliferæ, followed Cæsalpinus in looking to the fruit for his main characters; but so far as influence is concerned, Ray is the founder of a natural system of classification in England. He acknowledged his obligations to Jungius of Hamburg. His primary division was into Flowerless and Flowering Plants. The latter he separated into Dicotyledons and Monocotyledons, and he recognised the natural groups Fungi, Musci, Filices, Compositæ, Umbelliferæ, Labiatæ, Boragineæ, and Cruciferæ. In his "Historia Plantarum," completed in 1704, he describes 6000 plants, and in the second edition of the Methodus (1703), he classifies about 18,000, then known. His "Synopsis Methodica Stirpium Britannicarum," published first in 1690, was "the first *systematic* Flora of Great Britain." Of him A. L. de Jussieu wrote in 1719, "Non a floribus tantum fructibusve, sed etiam a foliorum, caulium, radicumque tantum partium organicarum figura earumque colore, odore, sapore, et totius plantæ facie exteriori sumenda esse genuinæ methodi principia affirmabat."

Rivinus first insisted on the classificatory importance of the flower, especially eulogising Cæsalpinus and Ray. Tournefort first defined genera as now accepted; but in his classification he kept Theophrastus's old division into trees and herbs, basing his subdivisions entirely on the corolla. He distinguished the Compositæ, Scrophulariaceæ, Labiatæ, Rosaceæ, Cruciferæ, Umbelliferæ, Caryophyllaceæ, Liliaceæ, Amentiferæ, Ferns, and Fungi; but the primary division renders his system far inferior to that of Ray. It, however, prevailed on the continent till the time of Linnæus, as did Ray's in Britain. Tournefort described 698 genera, including 10,146 species. Among British botanists of this period it will suffice to name Plukenet, Bobart, Buddle, Petiver, Sloane, Dillenius, and Blackstone. The "Specimen Botanicum" of the latter, Pulteney says, "I consider as the last book published in England on the indigenous botany before the system of Linnæus had gained the ascen-

dancy over that of Mr. Ray." It was published in 1746.

Carl von Linné, born in 1707, died in 1778. The first sketch of his artificial sexual system appeared in his "Systema Naturæ," published at Leyden in 1735, and it was further carried out in the "Genera Plantarum" (1737) and the "Species Plantarum" (1753), in which no less than 7294 species are defined. Linnæus's great services to botany were the establishment of the binomial system of nomenclature and of verbally-accurate and terse definitions. He required every species to be definable in twelve words. He adopted Ray's division of the vegetable kingdom into flowering and flowerless, coining the names Phanerogamia and Cryptogamia, and then divided phanerogams into twenty-three classes by the number and character of the stamens. These were mainly subdivided into Orders, according to the number of carpels. Linnæus himself only regarded this as a tentative system for practical purposes. "Methodi naturalis fragmenta," he writes, "studiose inquirenda sunt. Primum et ultimum hoc in botanicis desideratum est. Natura non facit saltus. Plantæ omnes utrinque affinitatem monstrant, uti territorium in mappa geographica . . . Diu et ego circa methodum naturalem inveniendam laboravi . . . perficere non potui." I cannot refrain from quoting the following advice to the tyro from his "Philosophia Botanica" (1751), in which work he lays down the sensible rules, "Descriptio ordinem nascendi sequatur," and "Descriptio compendiosissime, tamen perfecte, terminis tantum artis, si sufficientes sint, partes depingat." "Tyro ignotas sibi plantarum species investiget ipse, secundum classes, characteres, differentiasque systematis.

"Principia et Fundamentum Botanices rite intelligat.

"Historiam literariam Botanices sibi familiarem reddat et imprimis auctores de speciebus plantarum consulendos. Synonyma auctorum, retrogrediendo ad inventores, evolvere adsuescat."

The "Flora Britannica" of Dr. (commonly called Sir) John Hill was the first work arranged on the new system in England; but, as Sir J. E. Smith said, it was the "Flora Anglica" of William Hudson, first published in 1762, that "marks the establishment of Linnæan principles of botany in England." A second edition appeared in 1778, the year of Linnæus's death. Sir James Edward Smith, who purchased Linnæus's herbarium and library, and was the main founder and first president of the Linnean Society, established in 1788, strongly, in fact, too strongly, supported the Linnæan system, adopting it in his "Flora Britannica" (1800–4) and in his "English Flora" (1824–8). In 1776 appeared the first edition of that very influential work, the "Botanical Arrangement" of William Withering; and it is most important for the student to note that Linnæus, Hudson, Withering, and Smith very frequently meant very different plants when using one name. In 1777 William Curtis commenced the "Flora Londinensis," which he continued till 1798, the year before his death, and in 1787 he began the "Botanical Magazine." Sir James Smith in 1790 commenced the issue of "English Botany," illustrated by James Sowerby, and in 1807 Professor Thomas Martyn, in the ninth edition of "Miller's Gardener's and Botanist's Dictionary," may be said to have summarised the botany of his time with considerable attention to early authors.

We next come to the last of our four periods, that of the rise of the natural system—a period in which the growth of our knowledge of plants may be partially estimated from the facts that in 1819 Augustin De Candolle estimated the known species of phanerogams at 30,000, in 1839 Loudon enumerated 31,731; in 1846 Lindley gave 80,387, and in 1853, 92,920.

It is Bernard de Jussieu to whom belongs the glory of working out the true natural system, which he embodied in his arrangement of the Trianon Garden (1759). In 1773 his nephew, Antoine-Laurent de Jussieu, having studied his uncle's grouping, communicated a paper to the Académie des Sciences on the Ranunculaceæ, in which he showed the great truth of the relative value of characters, that they must be weighed, not counted. He extended his views to other Orders in the following year, and in 1789 published his "Genera Plantarum secundum Ordines Naturales disposita," which, according to Sir Joseph Hooker, "with slight modifications, has ever since retained its position as the basis of a complete scientific classification."

Robert Brown (born 1773, died 1858), "facile princeps botanicorum," as Humboldt termed him, was the first in this country to advocate the natural system. This he did in his "Prodromus Floræ Novæ Hollandiæ," published in 1810. In 1818 Augustin De Candolle commenced his "magnum opus," "Prodromus Systematis Naturalis Vegetabilium," which has been, with the assistance of many botanists, completed, in seventeen volumes, by his son Alphonse in 1873, and contains descriptions of every known species of Dicotyledon.

In 1821 was published the first British Flora on the new system, Samuel Gray's "Natural Arrangement of British Plants," and in 1829 Dr. Lindley produced his "Synopsis of the British Flora." In 1830 Sir William Jackson Hooker, who had continued the "Flora Londinensis" from 1821 to 1828, published the first edition of his "British Flora," and in 1843 Professor Babington issued the first edition of his "Manual of British Botany." Then commenced those great series of works which immortalise the names of Loudon and Hewett Watson. Loudon may be termed the Martyn of the period, and his works, especially the "Encyclopædia of Plants" (1855) are a wonderful summary marking the progress of half a century. Mr. Watson, in his

"Cybele Britannica" (1847–1859), not only did for British plants what Alphonse De Candolle has done for those of the world in his "Géographie Botanique" (1855), but anticipated many of the principles of that work. Leaving unmentioned much important matter in the pages of periodicals such as the "Phytologist," the "Journal of Botany," the "Gardener's Chronicle," and SCIENCE-GOSSIP, I will conclude this list of authorities with the name of a great work still in progress, the "Genera Plantarum" of Mr. Bentham and Sir Joseph Hooker.

There are, of course, many other important works published abroad, besides special papers, &c., of English authorship; I shall even refer to others in my research into the history of Thalictrum; but these are, I think, those most generally important in the history of British Botany.

G. S. BOULGER.

ON THE COLOURS OF ANIMALS, AND THE ARRANGEMENT OF PIGMENT IN LEPIDOPTERA.

By ALEXANDER M. MCALDOWIE, M.B., C.M.

ALTHOUGH limited to a few spots in man and a few of the higher vertebrata, and altogether absent in some of the lowest forms of animal life, pigment is of almost universal occurrence in the zoological kingdom. We gaze with wonder at the dazzling splendour of the tropical birds and butterflies which adorn our museums, and we admire even more the softer beauty of the fauna of more temperate regions, yet all this variety of tint is due to the deposition in various parts of the body of colouring matter, the nature and uses of which are as yet in many instances but imperfectly understood.

In some cases the use of pigment is to protect the deeper tissues from the bright glare of the sun by absorbing the rays of light. This is its function in the eye, where it prevents the rays from being reflected back on to the retina and interfering with vision. In most animals, however, pigment is present for the purpose of enabling them to conceal themselves from their enemies or their prey; the colour of the animal, as a rule, bearing more or less resemblance to that of the soil, herbage, or foliage in which it lives. This is very strikingly seen in the "leaf" insects, where the likeness is so close as to merit the appellation of "protective mimicry." It may also be observed in the eggs and young of birds which nidificate on the ground.

Some animals possess the power of changing their colour in a certain degree and assuming that of the surrounding medium. We have only to recall the story of the chameleon in illustration of this. It occurs in several reptiles, batrachians, and fishes.* Many species of cuttle-fish can change their colours rapidly under irritation or excitement. In birds and mammalia, however, change of colour takes place much more slowly, and is produced by shedding the feathers or hair. This takes place at certain seasons; during the breeding season more especially, also in the winter. The former is seen in the ruff and many other birds, the latter in the ptarmigan, ermine, hare, and others. The minnow, stickle-back, and several other fishes exhibit bright iridescent tints during the spring time.

* See an interesting note on the Angler Fish in SCIENCE-GOSSIP for July.

While noticing the uses of colouring matter in the

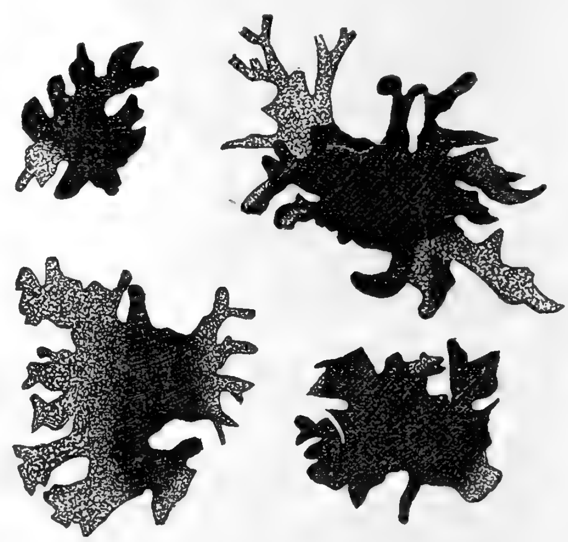


Fig. 33.—Pigment-cells from the Tadpole.

Fig. 34.—Pigment-cells still cohering, from the choroid; mag. 370 diameters (after Heule); *a*, nucleus.

Fig. 35.—Ramified pigment-cells, from the tissue of the choroid; mag. 350 diameter (after Kolliker).

animal kingdom, it is interesting to observe the difference between animals and plants in this respect. The colours of flowers are now understood to have reference only to the visits of insects.*

Pigment exists in the form of minute granules deposited in the connective tissue corpuscles or the epidermic or epithelial cells. The pigment-cells of connective tissue are usually of a stellate or ramified form (fig. 35), containing numerous processes. The nucleus of the cell remains colourless, and, as a rule, the ends of the processes contain no pigment. Brüke and Buchholtz have observed movements in the stellate pigment-cells of batrachians and fishes. The

* "Flowers," by Dr. Taylor, p. 14.

pigment granules were seen sometimes congregated in a spheroidal mass round the nucleus, at other times diffused in a radiating manner through the cell or into the processes. The movements were accompanied with shortening and elongation of the ramifications.

The changes of colour observed in the animals noticed previously are caused by alterations in the form of the pigment-cells, and are produced either spontaneously, or by variations in the intensity of light, or by other external stimuli. R. Wagner has observed extraordinary mobility in the pigment-cells of cuttle-fishes, which contain pigment granules of different colours and are termed "chromatophores." Von Wittich * has described the changes produced in the cells of *Hyla arborea* by electrical excitation, although Professor Rollett was unable to perceive any influence exerted on the pigment-cells of batrachians by the action of induction shocks of electricity.

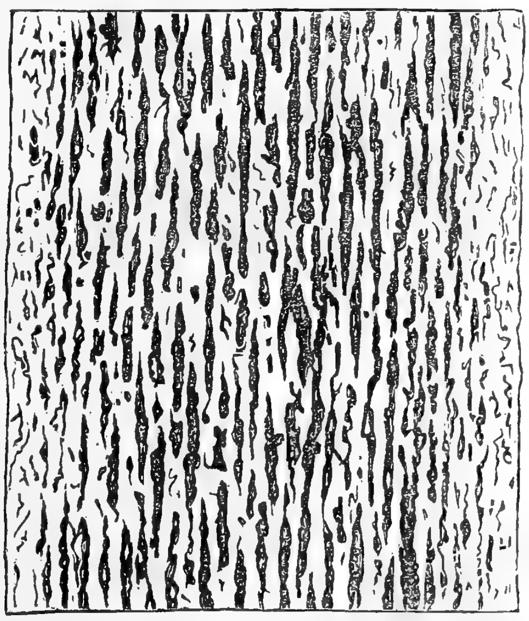


Fig. 36.—Cortical section of horsehair, showing the linear arrangement of pigment. ¼-inch.

The pigment granules vary in colour and shape. Under the highest powers they exhibit no definite form, being often subcylindrical, or elongated with rounded extremities. Beale says: "They may be removed from the cell, and when they escape into the surrounding fluid they exhibit molecular movements." † In vertebrate animals the pigment is derived from the red blood corpuscles. These, as they grow old, part with their colouring matter to the serum. From thence it is taken up by the pigment-cells and condensed in their interior, where it undergoes several chemical changes and passes through several shades of colour. Rindfleisch states: "Should they (the pigment granules) be numerous enough to fill the protoplasm of a cell, the colourless nucleus is partly pushed aside, partly surrounded; the pigmented cell appearing to be perforated by a circular gap or hole. Flat cells (choroid coat of the eye), in which the nucleus is in contact with both surfaces at once, retain their characteristic aspect (fig. 34). In spheroidal cells, however, the nucleus ultimately disappears, leaving a coloured corpuscle, in which only the external form of the cell can still be recognised." *

The source of the pigment in the invertebrata is not definitely known.

Pigment is also found in animals deposited in the hair, feathers, and other tegumentary appendages. In these situations it is not enclosed in cells. The pigment granules in the hair are located in the cortical

Fig. 37.—Portion of broken scale from *Argynnis Adippe*, ⅛ inch.

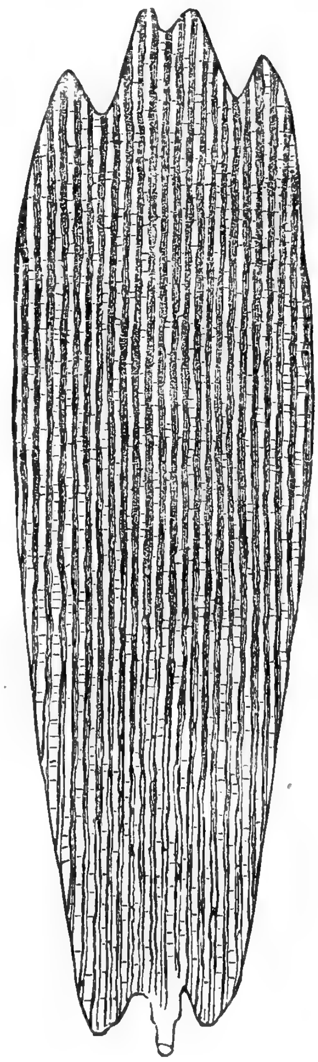


Fig. 38.—Black scale from *Vanessa urticæ*, ⅛ inch.

tissue, disposed in lines running parallel to the axis of the hair (fig. 36). They are exceedingly minute, estimated in the human hair at $\frac{1}{150000}$ inch in diameter. It is here that we must look for an analogy with that occurring in Lepidoptera. The scales of Lepidoptera are homologous to hair or feathers in their situation and appearance, and also analogous in their function. We find likewise a similarity between the arrangement of pigment in the scales and that in hair. The pigment is deposited between the fine membranous layers which compose the scales, and is arranged in parallel lines corresponding to the situation of the ribs or striæ. Under the microscope these appear as straight dark lines with irregular edges (fig. 37). As

* Müller's "Archiv," 1854, p. 41.
† "The Microscope in Medicine," p. 154.

* "Pathological Histology," vol. i. p. 62.

a rule the pigment is most thickly deposited in the upper third of the scale. It is sometimes altogether absent from the lower third. But it is occasionally pretty equally distributed over the whole scale, and down into the foot-stalk.

In a broken scale of the *Argynnis Adippe* the dark lines of pigment at the seat of the fracture appeared broken up into small irregular particles (fig. 37). These had no definite form, but were mostly angular in outline. It is not probable that these were the ultimate molecules of pigment.

In examining the scales from the wings of Lepidoptera which had been decolorised by chlorine, the lines appeared to be unchanged in their outline although they were not nearly so dark as before. To the naked eye the wings themselves had a translucent membranous appearance.

Many of the bright and lustrous tints seen in Lepidoptera are not due to pigment, but are produced by the surface and edges of the scales, which have the power of absorbing some of the prismatic colours and reflecting others.

MICROSCOPY.

A LIVE-BOX.—I send you a drawing of a live-box, which might be of interest to your readers. A, A are glass slips; B, B are brass bands; C, C are wedges;

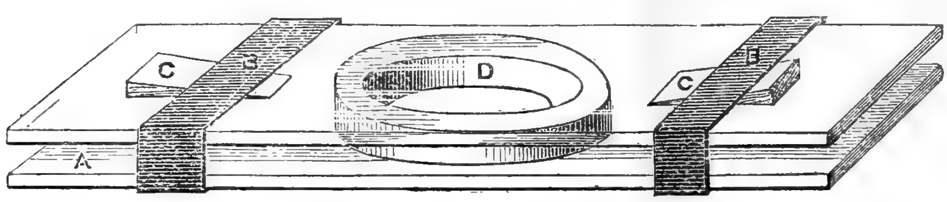


Fig. 39.—Improvised live-box.

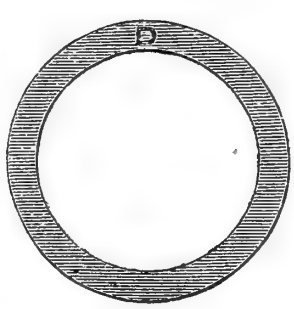


Fig. 40.—Thick indiarubber ring for live-box.

D is an india-rubber ring. The advantage gained by using this form of live-box is that it is thoroughly water-tight, and that it can be taken to pieces, cleaned, and put together in a very short space of time.—*Albert Smith.*

NEWCASTLE MICROSCOPICAL SOCIETY.—A general meeting of the North of England Microscopical Society was lately held. The following officers are appointed for the ensuing year:—President, Professor G. S. Brady, Mr. M. H. Robson, and a committee of ten. The inaugural meeting was held on Wednesday, January 8. This society has been formed to meet a long existing want amongst microscopists, who will now have an opportunity of meeting at regular intervals with excellent accommodation, and under the direction of an organised society, which since the dissolution of the Newcastle-upon-Tyne Microscopical Society in 1864 they have not possessed.

THE PYGIDIUM OF INSECTS.—At a recent meeting of the Royal Microscopical Society, Mr. Henry Davis read a paper on this subject, in which he showed that the organ which went by this name had its representative in the Neuroptera, and other groups of insects, as well as in the flea, and the lacewing fly. He regarded the pygidium as a special organ of sensation for conveying to the insect an intimation of the presence of dangerous enemies.

ZOOLOGY.

BIRDS MIGRATING.—In compliance with your correspondent's wish, I write to tell you that I have noticed here (Oporto), during August, a migration similar to that mentioned in SCIENCE-GOSSIP of October 1. The night of August 26 was dark and hazy, the wind light and from the south or south-west. I heard more particularly from eight to nine o'clock P.M. fluty querulous notes from birds flying over my house from north to south, and not very swiftly. There appeared to be only one species, and the notes were in sets of four—tchoo-hoo-hoo-hoo. It was impossible to see the birds, although I tried repeatedly when some must have passed close over the house, which is on a hill to the north side of the mouth of the Douro, and about eight minutes' walk from the sea. They seemed to pass in small flocks, keeping up a constant calling and answering. The notes were heard chiefly from eight to nine, but continued less frequently till late on in the night. I believe that hundreds, if not thousands, must have passed during that night. They had been heard some nights previously also. It would be interesting to learn the species to which these migrants belonged. That they were some species of large sandpiper I feel pretty certain, and I suspect they were red-shanks. Can any of your correspondents suggest how this could be ascertained with certainty? I noticed some days previously numbers of red-shanks, ringed dotterel, whimbrel, turnstones, and some smaller sandpipers on the banks of the Douro. Most of these were late arrivals from the north. Some possibly may have passed Maidstone! I suppose it would be difficult to devise some way of catching them while flying over at night? Could the phonograph be available for comparing the notes of birds? This is an interesting locality for observing the migration of

birds, such as the turtle dove, wood pigeon, hoopoe, flycatcher, pipits, skylark, starling, red-wing, lapwing, golden plover, &c. We have arrivals of birds from the north to spend the winter here before all our summer visitants leave for the south.—*Wm. C. Tait, Foz do Douro, Oporto.*

HOUSE-FLIES AND THEIR PARASITES.—There can I think be little doubt that the parasite described by the Rev. W. Marsden Beeby was the young nymph of one of the Gamasinæ, which species or genus it would not be possible to say from the description, nor indeed are the genera and species of this family well settled. With regard to the question of whether the creatures are parasitic, or rather to what extent they are so, this is still a subject on which opinions differ; the older writers considered that many species were parasitic in all stages, but the researches of modern French acarologists make it probable that they are only parasitic in the larval stage, and in the active asexual stage which is called the nymph. M. Megnin, whose opinion deserves the highest possible consideration on such a subject, considers that the parasite is not in any way injurious to the fly, and only uses the fly, or other insect or creature, as a means of conveyance. I confess, however, that my own observations of the positions in which the nymphs of gamasids are found upon dipterous and hymenopterous insects would rather have led me to the conclusion that, at all events in some species, the gamasid seeks nourishment from the juices of the insect. The instruments resembling the large claws of a lobster would be the chelate mandibles of the Gamasus. These resemble the large claws (or chelæ) of the lobster and craw-fish, inasmuch as they are chelate, *i. e.* nipper-like, the fixed side of the nipper being formed by a toothed prolongation of the penultimate joint of the chelate limb or organ, and the movable side by the ultimate joint, which is drawn by powerful muscles against the prolongation of the penultimate. These mandibles, however, are not, like the lobster's claw, hard throughout their whole length; the two final joints only are hard, the posterior ones being elastic and extensible at will, so that the mandibles can be greatly protruded or wholly withdrawn within the body of the gamasid, nor can they probably be considered to be the true homologues of the lobster's claws, as these appear to be the appendages of the ninth cephalo-thoracic somite, and to constitute the anterior and prehensile pair of the ambulatory legs, whereas in the gamasid they are true mandibles. I confess that Mr. Beeby's description of the teeth made me somewhat hesitate as to whether the parasite was really a gamasid, as I am not aware of any mouth organs in Gamasinæ which can properly be called teeth. The mouth consists of the labium and maxillæ, which together form a suctorial sharp-pointed tube, of the mandibles above mentioned, a labium or lingua, and of a pair of maxillary palpi. At the base of these, however, is an organ somewhat corresponding to the galea in Orthoptera, and this may possibly bear spines in some species. Finally, I may say that the acarid would not have remained long on the fly's foot; if left alone he would soon have mounted into some more convenient position on the body. If it were not for size, Mr. Beeby's description would answer equally well for a chelifer (say, such an one as Hermann's *C. parasita*, "Mémoire aptérologique," p. 117); indeed the pedipalpi of the chelifer are even more like lobsters' claws than the mandibles of the gamasid, but I presume that one of these well-known creatures would have been at once recognised. It is of course extremely easy to distinguish between the two, as the abdomen of the chelifer is segmented, while that of the gamasid is not.—*Albert D. Michael.*

"A RARE SPECIES OF HEMIPTERA."—Would it be possible to obtain from "John Davis" (the writer of the article headed "A Rare Species of Hemiptera," p. 9) an example of the creature which he describes? This I admit has fairly puzzled me. His calling it both a hemipterous insect and afterwards a "beetle" or a coleopterous insect is decidedly peculiar.—*C. O. Waterhouse.*

BIRDS AND FRUIT.—On December 23, whilst taking a country walk, I was surprised to see a hawthorn tree which grew up out of the hedge, laden with the following birds:—fieldfare, missel-thrush, song-thrush, blackbird, and green linnet. The bush had been evidently richly laden with scarlet haws, and the ground was covered with those which had been shaken off whilst the half-starving birds were feeding. I concealed myself and watched the birds I had disturbed return to their banquet. There could hardly have been less than a hundred individuals, and the voracity with which they devoured the tempting berries was both amusing and gratifying. The remarks of Dr. Taylor, in that chapter of his recently published "Flowers; their Shapes, Perfumes, and Colours," relating to "Birds and Flowers," that the red or other colours of fruits are for the sake of attracting birds, just as the colours of petals are to attract insects, came to my mind with great force. In this way one could see how useful both the colour and the succulent pericarp must be to seeds protected by "stone" and pericarps in distributing the seeds far and wide in the droppings of the birds. During my walk I afterwards saw the blackbirds and thrushes devouring the scarlet berries of the holly in a similar way.—*T. G. Hudson, Wolverhampton.*

THE WEATHER AND THE BIRDS.—The incoming of severe wintry weather at the beginning of December had been foreshadowed to the ornithologist by the large numbers of northern birds which visited our shores. Flocks of snow-buntings, as well as northern ducks (as the "long-tailed"), wax-wings, &c., visited the eastern coasts. The fieldfares have

been unusually numerous, and no doubt the influx of birds will help our native species to give a good account of the larvæ of insects. Wild duck, teal, widgeon, &c., were abundant in Norfolk and Suffolk, and were caught in immense numbers at the decoys. Scottish eagles found the Highlands too severe and drifted southerly to England, a golden eagle being shot at Fritton, near Lowestoft, where it and an uunsht companion had been attracted by the hosts of wild fowl, &c. The poor paltry poppers at small birds from behind hedges have had capital "sport" this severe winter!

ERRATA.—In my note at page 14 of SCIENCE-GOSSIP for *Ziphius curvirostris* read *Ziphius cavirostris*, and for Professor Fowler read Professor Flower. —*T. Southwell.*

THE WATFORD NATURAL HISTORY SOCIETY.—Part II. of the second volume of the "Transactions" of this vigorous society is to hand, containing the Anniversary Address of the President (Dr. A. T. Brett), and papers on "British Butterflies" by the Rev. C. M. Perkins; "Observations on Injurious Insects," and "Economic Entomology," by Eleanor O. Ormerod.

THE MOA NOT YET EXTINCT (?)—A miner writes to a New Zealand paper to say that whilst he and his mate were prospecting for gold last autumn, between lake Rotorua and the Cannibal Gorges, in the province of Nelson, he saw what he believed to be the moa. His description is as follows:—"We heard a strange screeching noise in a gully about a hundred yards from where we were camped, and went to where the noise proceeded from, and to our surprise we saw two gigantic birds coming towards us. They did not show the least alarm at seeing us, but continued coming to where we were, so we took to our heels. We heard them two or three times that night again. Having no gun with us we thought it advisable to start the next morning, for fear they would tackle us. One of them was apparently about twelve feet high, and the other somewhat smaller, with feathers resembling the kiwi's."

BOTANY.

THE SEA LETTUCE (*Ulva latissima*).—At a recent meeting of the San Francisco Microscopical Society, a paper on the "Fruiting of Sea Lettuce," was read by C. L. Anderson, M.D., who said:—"A few days ago I collected a quantity of *Ulva latissima* for my marine aquarium. The fronds were well grown (October 26), of a beautiful deep green colour. The plant was put into the water at night. Next morning, quite early, the water had a turbid look, and I feared there was too much dead matter ever to become clear. But as the sun came to shine on the side of the aquarium, I noticed a band of green matter bordering the side in the sunshine, and adhering, apparently, to the glass at the upper surface of the water, and the aquarium was clear. When the green band was touched there seemed to be a dispersion of the material, but readily coming together again. Like a cloud of very minute insects they were constantly changing the form of the mass, and, amœba-like, throwing out processes here and there, the greater part, however, clinging to the glass. Putting a small quantity under the microscope I found two kinds, or forms. One was quite round, and moved slowly, with an irregular rolling motion. I could not detect cilia, although the motion would indicate their presence. The other form was smaller, conical, and very active, moving so rapidly that at first I could not make out its form. A careful inspection revealed the fact that they were the zoöspores of the ulva. The conical form had filaments at the apex. Carpenter says 'ciliated.' I would rather consider them as accessory to cilia, and intended as holdfasts that the plant may grow. Both Dr. Carpenter and Dr. Wythe present illustrations of these zoöspores, showing their development from the frond cells of the ulva, and Carpenter remarks that 'they might easily be taken for true infusoria.' And so they might. On further examination I found some of these zoöspores clinging to the broken walls of the cells, both forms, and exhibiting active exertions to be free. As to the generative process, of which Carpenter says, 'nothing whatever is known,' I am of the opinion that the filament spores are fertilised after their escape from the cell by the round spores, and that the latter, having performed their function, like the antherozoa, disappear, and the filament spores become fixed and grow by the multiplication of cells peculiar to other algæ. The next morning these zoöspores had diffused themselves into the water, and the turbidity remains as it was the first morning before the 'swarming.' It is likely that nearly all these germs have perished in the water for want of a congenial place to become attached that they might grow."

"MONSTROSITIES" IN PLANTS.—In the middle of last summer I had many plants of Canterbury bells in my garden which had grown from seed that had been sown in 1876, only two plants of the lot having flowered in the year after they were sown, as biennials are supposed to do, and ripening their seeds before they died. The remainder became larger plants, and were all in the following summer now past covered with blossom. Some of the flowers were white, some blue. Among the plants with white flowers was nothing that I noticed as abnormal. Among those with blue flowers two plants presented variations worthy of notice. One of them was crowned with a terminal head of synanthic flowers, as nearly as can be like the figure of such a production in Dr. Masters's "Vegetable Teratology." The corollas of several flowers were fused into an oblong dish, to one end of

which adhered a somewhat similar formation proceeding from the fusion of two or more flowers, forming a cup or vase not quite so long or shallow. These two structures adhered to each other by the outer surfaces of their compound corollas, and seemed as if they were made up together of about five or seven flowers. This curious phenomenon proceeded apparently from fasciation: not from fusion of lateral flowers, for the fused flowers were all equally terminal. In the Canterbury bell, as in other species of Campanula, the sub-terminal flower does not expand till after those on the lower branches, and therefore is considerably later than the flower which terminates the stem. By keeping in view this rule, the synanthic termination of a fasciated stem may be easily distinguished from any possible fusion of lateral flowers. No other instance of synanthy was observed on the plant where this occurred, though it had a profusion of well-formed single flowers. Another plant which flowered at the same time bore flowers each of which had a double corolla. Nothing in the flower was misshapen. The inner corolla was bell-shaped like the outer, and its segments alternated with those of that within which it was. The stamens too alternated with the segments of the inner corolla, a fact which I noticed in several flowers and think of some importance, as it would place them in a different position with reference to the sepals than is the case with stamens of a flower whose corolla is single. All these plants have since died. When withered flowers were removed, or the plants were not exhausted by ripening seeds, other flower buds grew and were expanded, but no leaf bud was developed that might form the basis of a new growth. No foliar prolification was to be found in any of the plants whose lives were strictly limited, so that it seems as if they cannot by any means become perennial.—*John Gibbs.*

TERATOLOGICAL NOTES.—I see in the September number of SCIENCE-GOSSIP a short account of the

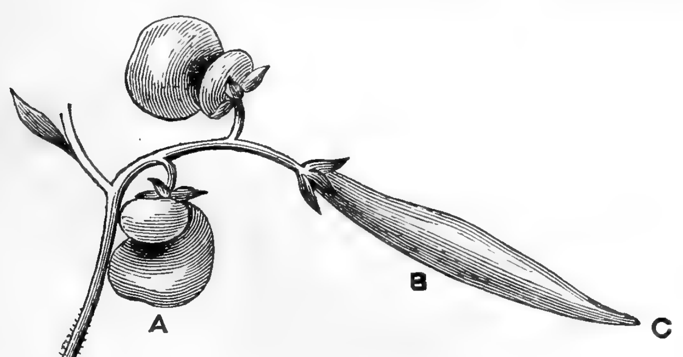


Fig. 41.—"Monstrous" Calceolaria; A, ordinary corolla; B, elongated hollow corolla, terminating in a small opening at C. Reduced ⅓.

malformation of a common cabbage leaf. My slight experience of a similar phenomenon may be of interest. Some two or three years ago I came across a similar instance to that mentioned by your correspondent. In my case several of these curious leaves were produced on the same plant within a short period of time, all more or less resembling one another. I have been informed by a friend that he has observed the same appearance in a geranium leaf. I have enclosed a rough sketch of curious form in the flower of a calceolaria. Two of these have been produced at about the same time on different plants in the same garden. I may mention the plant under consideration was not the common yellow variety, but a rich red-coloured species known to gardeners by the name "Prince of Orange."—*A. H. Hintor.*

TERATOLOGY OF CLOVER.—I have found a head of Alsike clover, in which all the pistils are transformed into foliage leaves, similar, but on a smaller scale, to a single lobe of the regular leaves.—*B. K.*

EXCEPTIONAL FRUITFULNESS OF MOSSES THIS SEASON.—Is it the general experience of muscologists that the present season is an exceptional one with regard to the fruitfulness of mosses? In this district several kinds not generally in fruit are found with fruit, such as *Hypnum purum*, *squarrosum*, *tamariscinum*, *triquetrum*, *loreum*, &c. In an excursion of a few hours lately my brother and I found nearly sixty different species, more than one-half of which were in fruit.—*R. Wood, Rosley Vicarage, Carlisle.*

NEW SPECIES OF ISOETES.—Dr. Moore has recently given an account of a new species of Isoetes found in Upper Lake, Bray, county Wicklow, Ireland, which has been named *I. Moorei.* It strongly resembles *I. lacustris.*

WHITE VARIETIES.—I found two perfectly white plants of *Geranium pusillum* by a roadside in South Devon last autumn. In SCIENCE-GOSSIP for 1875, page 68, there is an account of a white variety of *G. molle*: as both nearly resemble each other, one of us may be mistaken. They are not mentioned in any botanical work I have seen.—*R. W. W.*

RANUNCULUS FICARIA.—Whilst taking a morning walk, at the beginning of last year, I was surprised to find what a difference occurred with regard to the number of petals in the lesser celandine (*Ranunculus Ficaria*). The smallest number I counted was six, and the largest on one flower was sixteen, just double the usual number. Probably in the latter case, some of the stamens had been converted into petals, but at that time I did not think of observing whether this was the case or not.—*J. A. Weldon, Northallerton.*

A NEW SPECIES OF BRITISH MOSS.—At a recent meeting of the Linnean Society Mr. E. Holmes showed examples of a species of Moss, *Aulacomnion turgidum*, new to our British cryptogamic flora. This acquisition had been obtained by Mr. West, a Bradford botanist, in Yorkshire. Mr. Holmes made some remarks, and comparisons between this species and *A. palustre.*

GEOLOGY.

Burrow, the Geologist.—In your December number a slight reference is made to Mr. John Burrow, the "Settle Palæontologist"—where he is mentioned as "having spent his life in working out the palæontology of his district." Perhaps it may be worth noting that this was not strictly the case, and also that Mr. Burrow's work, in the fields of science, furnished us with a good instance of what may be done—as an interesting amusement—by our English youth. I first made the acquaintance of Mr. Burrow at Cambridge (where we kept in the same staircase), and afterwards had the privilege and pleasure of renewing our friendship in his own much loved Craven district. I frequently accompanied him to his pet productive spots about Settle, which he had explored for a considerable distance, and from which, by patient energy, he had made a rich ingathering of fossils—and all this (the point mainly to be noted) while he was as patiently working his way to the height of the sixth form in the neighbouring school at Giggleswick. At Cambridge he won triple honours—in mathematics, classics, and natural science—still keeping to geology as a recreation, and proceeding with the work of fossil-arrangement. Hence I venture to say that the great work which he did among the carboniferous rocks for palæontology, *was the work of a schoolboy*, and that, too, at a time when "natural science" was never mentioned in public school-life. Would that nowadays the interest of this kind of recreative health-giving science could compete in greater degree with the much-absorbing interests of athletics, cricket, and football, in our English schools.—*Matthew Wood, Evesham.*

The Ultra-gaseous State of Matter.—One of the most important discoveries in molecular physics is undoubtedly that just communicated to the Royal Society by Dr. Crookes, in a paper entitled "The Illumination of Lines of Molecular Pressure, and the Trajectory of Molecules." It has been so long taken for granted that there could be only three conditions in which matter existed—the solid, liquid, and gaseous—that it comes upon us with downright surprise to hear of a *fourth* condition—the ultra-gaseous. But there can be little doubt that Dr. Crooke's experiments have proved this. The paper is reported at some length in "Nature" for December 12, and we refer our readers to it for the details of the delicate experiments from which this important conclusion is arrived at. It would seem that the hypothetical "ether" of astronomers, which is supposed to fill space, is not so supposititious as some have argued.

Marine Fossils in Gannister Beds.—Your correspondent, Jas. Nield, of Oldham, has, I am afraid, somewhat misapprehended the gist of my late discovery of the above in Northumberland. The occurrence of marine forms in the lower coal-measures of England (not to be confounded with the often misnamed "lower coal-measures" of Scotland, which are the equivalent of our carboniferous limestone series) has long been well-known to geologists, and the neighbourhood of Oldham is the classical ground for such finds. Up to the beginning of the year just expired, however, the gannister series north of the Tees had been determined and mapped by means of stratigraphical evidence only, none but plant remains similar to those characterising the overlying beds (middle and upper coal-measures) having been recorded from these beds in the district. In February 1878, I hit upon the first batch of marine fossils in the south of Northumberland. Since then I have found more elsewhere in the county, and I am informed that others have in the meantime been detected in carrying out mining operations in South Durham. The entire interest of the find lies in the palæontological evidence of occasional marine conditions having persisted from upper carboniferous limestone or Yoredale beds into those of the coal-measures much further north than was believed by many (including myself) to be the case. Some important theoretical considerations with regard to the classification of the carboniferous rocks depend on such facts, and give them a greater interest than they might, at first sight, be supposed to possess. In the original notice of my find in "Nature" an unfortunate misprint occurred—*country* for *county*—whence, notwithstanding immediate correction, the present misapprehension may have arisen. Some account of the beds and their fossils will be found in my recently issued "Outlines of the Geology of Northumberland."—*G. H. Lebour.*

Pleistocene Deposits of the Cornish Coast, near Padstow.—This was the subject of a paper recently read before the Geological Society, by Mr. W. A. E. Ussher, F.G.S. The author described certain deposits seen in a small bay near St. Enodock's chapel, and known as Daymer Bay, and in section at Greenway cliffs. The former included a portion of raised beach, and a reef of consolidated old beach and a peaty deposit below high-water mark, the raised beach indicating a depression of from 5 to 10 feet and a subsequent elevation of more than that amount, during a pause in which the lower beach was formed. The further elevation of the coast was sufficient to favour the growth of forests furnishing the peaty bed, which a subsequent subsidence has brought down to its present level. Greenway cliffs consist of grey slates, resting against which, in two places, are old consolidated blown sands; about 5 feet above high-water mark is a raised beach, near which the face of the cliff consists of "head" capped by gravel. Mr. Ussher discussed the relative ages of these deposits, and inclined to regard the gravel as a fluviatile deposit, and the stony loam or "head" as an ancient talus or flood-gravel, both deposited before the raised beach.

PECULIAR FOSSIL BRACHIOPOD.—Mr. John Young, F.G.S., has discovered a new species of Rhynchopora in the upper series of the carboniferous limestones, at Bowertrapping, near Dalry, Ayrshire. This genus was established by Professor M. King, of the Queen's College, Galway, for a species of Rhynchonella, whose shell showed a distinct perforated structure, which he had found in some places on the Continent in the Permian formation. Before the discovery of a perforated structure in this species it was included in the genus Rhynchonella, but is now named *Rhynchopora Geinitziana.* Mr. Young finding the carboniferous specimen to be distinctly perforated sent it for determination to Mr. Thomas Davidson, F.G.S., Brighton, author of the Monograph of the "British fossil Brachiopoda," and he being satisfied of its punctate structure, forwarded it to Professor King, who writes that it is undoubtedly a new and second species of his genus Rhynchopora, and that he considers the carboniferous species an interesting discovery, confirming all he had already written as to the structure of the Permian shell. It is proposed by Mr. Davidson, who will figure and describe Mr. Young's specimen, to name the species *Rhynchopora Youngii* in honour of the discoverer.

SILURIAN FOSSILS IN THE GIRVAN DISTRICT.—This is the subject of a monography by Professor A. Nicholson and Robert Etheridge, jun., published by W. Blackwood & Sons. The monograph is a detailed descriptive catalogue of the fossils of the Silurian area of Girvan in Ayrshire, a district which has long presented peculiar geological difficulties. The authors have been assisted in their arduous work by a Government grant made through the Royal Society, and also by Mrs. Robert Gray, whose cabinet of Girvan fossils is especially rich, and has been of great use to the authors.

FOSSIL ENTOMOLOGY.—We specially direct the attention of our geological readers to the exhaustive and suggestive series of papers which are appearing in the "Entomologist's Monthly Magazine," on "Fossil Entomology," by Mr. Herbert Goss, F.L.S., F.G.S. The fourth paper appeared in the January number, on "The Insecta of the Carboniferous Period, and the Animals and Plants with which they were correlated."

NOTES AND QUERIES.

PIPING BULLFINCHES.—With reference to a query under head of "Piping Bullfinch" inserted in SCIENCE-GOSSIP for January, I would remark that Gilbert White no less than three times in his "Natural History of Selborne" alludes to the fact of the plumage of bullfinches becoming dark or black-coloured from the administration of hemp-seed. In the latest edition of White's "Selborne," by Thomas Bell, Esq., the author in a footnote states that the effect of a diet of hemp-seed in blacking the plumage of birds, and particularly the bullfinch, is now well known.—*John Colebrook.*

THE DOUBLEDAY COLLECTION.—Having lately gone through the above collection, it is satisfactory to say the collection is less deteriorated than appeared to be at first sight. There is not one type in the whole collection lost. Some erroneous statements have crept into several periodicals, stating that 238 species have been destroyed by mites. This I deny *in toto.* The collection is open for inspection, and all those interested are invited.—*James English.*

LEAFLESS TREES.—Although at the present wintry season of the year but few flowers either in the garden or the woods are left to gladden the sight, there is still to the observant eye a never failing charm in the leafless trees. When seen against a clear grey sky, each one has a form and beauty all its own—

> "Alike yet various.
> Here the grey smooth trunks of ash, or elm, or beech, distinctly shine
> Within the twilight of their distant shades."

No tree in all the grove but has its charms, and each its hue peculiar at all seasons of the year; and we may, if we are observant, learn to distinguish the several kinds of trees as easily by their outlines in winter as by their leaves in summer. We have also been much interested in noticing the colour of the leafless trees surrounding our home when the sunshine has lighted them up; they then appear as if tinged with a deep red colour. We have much pondered over this appearance of the trees in the sunlight. We have since seen it noticed in a little book on "Field Flowers," by Shirley Hibberd. He remarks that, "if you had to paint a winter scene with sunshine, you would have to wash all the trees with a tone of red." What is the reason of this? We should be grateful if any of the readers of SCIENCE-GOSSIP would kindly explain the cause. Could it arise from the russet case, or envelope, in which the tender germ of the leaf is folded, uninjured, with inimitable art, till the bitter winds and cold frosts of winter have passed away? May be, Keble refers to this appearance of the trees in the wintry sunshine when he writes in one of his most beautiful hymns:

> "Red o'er the forest peers the setting sun;
> The line of yellow light dies fast away
> That crowned the eastern copse; and chill and dun
> Falls on the moor the brief November day."

E. Edwards.

PARASITES ON PIGEONS.—The best means for destroying the parasites on fantail and other pigeons, your correspondent "M. G." will find is to syringe well the house in which the pigeons live, themselves, and their nests with carbolic acid, diluted with water, at the same time using very freely Keating's Insect Powder. There is no danger of the parasites found upon pigeons, fowls, or other birds, forsaking them for man or womankind; they will not live upon the human body. The most sensible reason why pigeons' feathers should not be used for stuffing pillows, &c., appears to be, because they are too *stiff,* they would *mat* together, and so make but an uncomfortable rest for the head. For the same reason game and other small birds' feathers would not be desirable for stuffing pillows; the old superstition why they should not be thus used, we believe to be entirely without reason.—*E. Edwards.*

INTERESTING PLANTS IN THE ROYAL GARDENS, KEW.—On the west side of the palm-house is a most remarkable plant, which has given rise to a great deal of writing upon the disputed phenomenon of parthenogenesis, viz. *Cœlebogyne ilicifolia,* a native of Australia, and included in the natural order Euphorbiaceæ. It is a small diœcious shrub with alternate spinose leaves closely resembling the common holly

(hence its specific name); the small greenish flowers are unisexual, the staminate flowers being borne on toothed bracts in axillary spikes, and the pistillate in a similar manner or in cymes. The first plants that arrived here were sent by Allan Cunningham, in 1829, and were all females. After a time some of these flowered, and, without the application of pollen, ripened seed which germinated and produced plants resembling the parent form. A communication of these facts to the Linnean Society by Mr. Smith ("Transactions of Society," vol. xviii.) drew considerable attention to the plant. Klotzsch examined the seed and stated that it contained a bud and not an embryo, but Braun, Radlkofer and others considered it as a true embryonic formation. Henslow states that it is possibly an analogous phenomenon to what takes place in some aphides, where one impregnation is sufficient for several generations. If that be the case, the definite settlement of any doubt resting upon the subject is merely a question of time, as it is almost impossible for true fertilisation to take place, there not being a single male plant in Europe. On the same side as the above we notice *Laportea stimulans*, an urticaceous plant with large crenulate ovate leaves, having numerous stinging hairs on both surfaces. This plant was found by Leschenault in Java, and he states that its sting produces inflammation and tetanic symptoms, similar to *Laportea crenulata*, but less severe. On the same authority we learn that the natives of Java rub buffaloes with the fresh leaves to excite them to fight with tigers. At the south end of the house is a magnificent specimen of *Grias cauliflora*, the anchovy pear of Jamaica, a native of the West Indies, included in the Order Myrtaceæ, tribe Barringtonieæ. Its generic name is derived from grao—to eat, alluding to the fruit; the specific name refers to the appearance of the flowers on the old wood. It is a slender, unbranched tree, having at the summit a crown of drooping lanceolate glossy green leaves, which are larger than those of any other dicotyledonous tree (3 feet long by 1½ to 2 feet broad). The large white flowers spring in clusters from the stem, but they are rarely seen, and this plant has never flowered. The fruits are pickled and eaten like mangos, which they are said to resemble in flavour. We find on the shelf at the east side of the house a small plant of *Hura crepitans*, the sandbox-tree or Monkey's "Dinner Bell," considered as a native of tropical America, but now cultivated for shade through the tropics generally. It is a Euphorbiaceous tree of extremely quick growth; the wood is so soft that a clap of thunder or gust of wind will break the largest boughs. The fruit is a woody capsule of many cocci, which in drying burst open down the back into two valves, at the same time separating from the axis with the noise of a pistol shot. The juice of the tree contains an extremely poisonous principle. Boussingault relates that when he and M. Rivero analysed some of the milky juice, they were both attacked with erysipelas. It forms a large branching tree, 30 to 40 feet high, bearing unisexual, inconspicuous, reddish flowers. The female flowers have a very remarkable trumpet-shaped style, with a reflexed, many-toothed, terminal portion. The seeds are occasionally administered as a purgative to negroes, but are extremely dangerous, for two seeds have produced death.—*Lewis Castle, West Kensington Park.*

The Cultivation of Mistletoe.—Seeing in the June number of Science-Gossip a botanical note by Mr. J. M. Higgins about growing mistletoe in Devonshire, where it is seldom seen, I thought it might interest some of your readers to hear about attempts to grow it in Edinburgh, where it is never found in a state of nature. In the first week of February I planted about twenty seeds of mistletoe, in the same way as Mr. Higgins, on hawthorn, service, plane, poplar, pear and apple trees, and I may add that in no cases were they pecked at by birds. On April 24, when passing one of the apple-trees, I noticed that one of the seeds had begun to germinate, and on examining the others I found them beginning to smell and turn green; and by May 1, other seven seeds had burst and had protruded small green suckers, which have since taken hold on the bark. By the beginning of June the rest of the seeds, with a few exceptions, had sprouted, those on the apple and hawthorn trees being furthest on and healthiest looking. I have therefore great hopes of growing the parasite, and I may mention that several gentlemen in the neighbourhood have been very successful in its cultivation; one plant in particular which I have seen several times in a garden near is remarkably handsome and strong, being, I believe, about seven years old. There is one very good specimen of mistletoe in the Edinburgh Botanical Gardens, and I believe several smaller plants in Warriston Cemetery. Can any of your readers explain to me why four of my seeds have sent out two suckers apiece, while the rest of them have only sent out one each?—*Horace N. Bonar, Edinburgh.*

The Nightingale in Yorkshire.—Last May a man found a nest in a wood near Ripon. He thought it was a tree-pipit's nest, with curious coloured eggs in it. He took them to Mr. Pratt of Ripon, who told him they were nightingales' eggs and not tree-pipits. This is the first nest I have heard of being found in Yorkshire.—*James Ingleby.*

Cuckoo's Visits.—Mr. Bennett asks if the cuckoo revisits the same place yearly. I believe it does. A neighbour told me last May he heard a cuckoo with a very peculiar note for the last four years near his house; he was almost sure it was the same bird. In answer to the inquiry for a description of the cuckoo's eggs: They vary very much in colour, and very much resemble the birds' eggs of the nests they are placed in. Some are like meadow-pipits, others pied wagtails, some lighter in colour and others darker, and small for the size of the bird.—*James Ingleby.*

The Cuckoo and her Eggs.—"The Universe," by F. A. Pouchet (Blackie & Son, 1877), speaking of the cuckoo laying her eggs in the nests of other birds, has the following, page 198:—"It is the nest of the golden crested, or common, wren that this bird selects for the accomplishment of its designs." Can any reader of Science-Gossip verify this statement from *personal observation?* Has any one *ever seen* a young cuckoo in a wren's nest? In matters of this nature statements not made from personal observation are of no value. After careful search and observation of many years, I have never myself found a cuckoo's egg or young except in the nest of a *ground-building bird*, never, indeed, except in the nest of the meadow-pipit and the grey wagtail. The writer also states that the cuckoo has "never more than *two eggs*." Has this been certainly ascertained, and how? Have any considerable number of birds been examined before the eggs come to maturity, to justify this statement?—*J. A. Kerr, Whiteabbey.*

Malformed Egg.—I have recently seen in this neighbourhood an egg from a Brahmapootra hen which contained within it another smaller egg. The inner egg was imbedded in the albumen of the outer one, and had pushed the yolk out of its normal

central position. Both eggs were covered by shell. Can any one explain the nature of this malformation? —*F. W. S., Todmorden.*

PRESERVING FOSSILS.—Having a number of mammalian remains from caves which seem liable to chip and decay after exposure to the air, I should be greatly obliged to any reader who would tell me the best treatment for their preservation. I have been advised to *paint* them over with hot solution of gelatine, but this does not appear to improve those specimens on which I have tried it. I should also be glad to learn the best plan of preserving fossils from the coal and chalk; some specimens from the lias are very liable to chip.—*W. G. Tuxford.*

PRONUNCIATION OF SCIENTIFIC NAMES.—The great difficulty is to find the place of the accent. There appears to be no certain rule for this; most frequently it is on the penultimate syllable, in other cases its place is determined by the etymology, and again in a few instances both systems find supporters, as in the case of verónica and veronica. Would it not be a good plan to mark the accented syllable in those generic and specific names occurring in at least the more popular of the manuals of the various branches of natural history? These accents need not appear on every repetition of the word, a good accented index would answer the purpose. The more fortunate of the dabblers in science, who live in large towns, and have the advantage of hearing lectures, and talking over their pet subjects with friends having a similar taste to their own, may not need this help, but it is different with those who live in out-of-the-way country places, and *read* but rarely *hear* anything about their favourite studies.—*W. G. Tuxford.*

BIRDS SINGING AT MIDNIGHT.—"X." expresses a wish to know whether it prevailed all over the country. I heard them singing on the nights of the 15th and 16th of February, 1878, and other nights as well.—*James Ingleby, Yorkshire.*

THE "FAGUS" OF CÆSAR.—Cæsar's words, "Materia cujusque generis, ut in Gallia, est, præter fagum atque abietem," have puzzled many, and Mr. Freeman has opened up a subject on which it may be hoped that other correspondents will give an opinion. Selby has touched on it in several places. It can scarcely be doubted that Cæsar must have seen the beech, which loves the chalk of Kent and Sussex, and is still *the* tree which characterises the hangers fringing the northern slope of the Sussex Downs, while as the sweet chestnut was (in all probability) introduced to Britain by the Romans, he appears to have noted its absence. Is it not then most likely that Cæsar's "Fagus" was the chestnut? Both trees grew in Italy in his days, as is apparent from Virgil. It may be observed that Linnæus included the beech and the chestnut under the same generic name "Fagus." Has this led translators of Cæsar into an error? Old Gerarde's quaint comparison of the fruit of the two trees is worth quotation. Speaking of the beech, he says, "The fruit or mast is contained in a huske or cup that is prickly and rough bristled, yet not so much as that of the chestnut; which fruit being taken forth of the shells or urchin husks be covered with a soft and smooth skin, like in colour and smoothnesse to the chestnut." "The beech tree," he adds, "loveth a plaine and open countrey, and groweth very plentifully in many Forressts and desart places of Sussex, Kent, and sundry other counties."—*F. H. Arnold, LL.B.*

COLOUR OF BIRDS' EGGS.—Can any of the readers of SCIENCE-GOSSIP inform me of any way to preserve the colour of birds' eggs from fading? I do not want varnish; something that will not show, but keep the colour from growing dull?—*James Ingleby.*

BIRDS USING OTHERS' NESTS.—In connection with birds appropriating the nests of others to lay in, the following may be interesting:—Walking through a small copse in the early part of the summer I disturbed a blue-tit which flew from a large bush. It was soon joined by its mate, and by their rapid motions and uneasy cries I concluded that their nest was not far off. There was, however, no likely place for it to be built, and I thought there must be some other reason for the uneasiness of the birds. In the bush before me there was a blackbird's nest, which, judging from its very untidy appearance, I expected to find empty. I tried it however, and to my surprise found it contained seven blue-tit's eggs. The blackbird's nest had probably been robbed early in the spring, and the tits had lined it with some soft material, and there laid their eggs.—*T. L. S.*

FOSSIL FERNS.—I remember seeing in the British Museum some years ago a number of fossil ferns, the impressions beautifully coloured a bright emerald green, without destroying the sharpness. I should be glad to learn what colour is used for this purpose, and how applied.—*W. G. Tuxford.*

QUERY ABOUT THE DAISY.—Will any reader kindly inform me on what authority Chaucer, in "The Legend of Good Women," states the following:—

> "The greatë goodness of the queen Alceste
> That turned was into a daïsy.
> She that for her husbandë chose to die," &c.
>
> * * * * * *
>
> "In remembrance of her, and in honour
> Cybele made the daisy, and the flow'r
> Ycrowned all with white, as men may see
> And Mars gave her a crownë red, pardie!
> Instead of rubies set among the white."

C. F. W.

POISONOUS ACTION OF DULCAMARA.—With reference to your correspondent's query relative to the poisonous action of Dulcamara on man, I would beg to quote some interesting remarks from Professor Taylor's work on Poisons (3rd edition). That great toxicologist writes: "There are two species of nightshade (*Solanum*) *S. Dulcamara*, bitter-sweet or woody nightshade, which has a purple flower and bears red berries, and the *S. nigrum* or garden nightshade, with a white flower and black berries. Duval gave to dogs four ounces of the aqueous extract, and, in another experiment, 180 ripe berries of the Dulcamara, without any ill effects resulting. On the other hand, Floyer states that thirty of the berries killed a dog in three hours. The differences may perhaps be reconciled by supposing that the active principle, solania, on which the poisonous properties of both species depend, varies in proportion at different seasons of the year. In one instance a decoction of the plant is said to have produced in a man dimness of sight, giddiness, and trembling of the limbs. In September, 1853, the red berries of the woody nightshade are stated to have caused the death of a boy aged four. He had eaten some of the berries, and at first did not appear to suffer from them; but eleven hours afterwards he was attacked with vomiting, purging, and convulsions, which continued throughout the day, the child being insensible in the intervals. He died convulsed in about twenty-four hours. Other children had partaken of the berries at the same time, but one of them suffered only slightly."—*Lancet*, June 28, 1856, p. 715. All my own books on botany certainly point to the conclusion that Dulcamara berries are poisonous, although of much less virulence than those of belladonna; from which I suspect persons ignorant

of the nature of these two solanums have been led into some confusion. In the preparation of a conserve from the berries, probably the active principle solania was dispersed, if so, not only half a pound, but a much larger quantity of it could be taken with impunity; moreover, because the French chemist Duval gave both extract and berries to dogs without injury, does it follow that man should escape? I believe goats might eat any quantity without harm. I imagine no parent in his or her senses would permit a child to eat Dulcamara berries unless they wished to compass its death.—*John Colebrook.*

BOMBYCIDE (SATURNIA).—I have a fine specimen of *Hyalophora Cecropia* (6 inches across the wings), caught *alive* last July in a friend's garden at Clapham. Can any of your readers account for this? These moths surely never breed in England? Is it not likely to have escaped from some entomological cabinet?—*James Ives.*

TADPOLES.—On March 15, 1878, I collected some frog's spawn, placing it in a small jar in a warm corner of my room, and was surprised at seeing one four days later. The little tadpoles had escaped from their prisons. At that time each was attached to its parent egg, all traces of which further on had disappeared. I also noticed the ciliary movement mentioned by "R. B. C.," but once only, although I made continual observations as the animals became more developed.—*H. H., Aldeburgh, Suffolk.*

A SPECTRE OF THE MOUNTAIN.—During a tour of two months on the Continent, I chanced to witness the following beautiful phenomenon:—On Sunday afternoon, September 1, 1878, we ascended the Eggischorn, from the Hotel Jungfrau (which is 7000 feet above the sea). We reached the wooden cross on the summit (9640 feet) at 4.15. The day was dull, and the clouds were too thick to enable us to see clearly the glorious view of the Alps; the Aletsch Glacier and Mergelen See alone being plainly visible. Having stayed there about an hour, we were on the point of descending, when one of our party exclaimed, "Look, there is a rainbow!" and turning round I quickly added, "It is a spectre!" for gradually the phenomenon became visible, showing ourselves on the clouds facing us (in the east), surrounded by a double rainbow. To make sure that we were not imagining this beautiful vision, we waved our alpenstocks and hats, which were clearly discernible. Our height appeared somewhat elongated, so that the bar of the cross was lost in the rainbow. One apparent difference between this phenomenon and the so-called Spectre of the Brocken, was that we were not magnified, only lengthened, and that the bow was more arched than is usual. There were two guides and an Alpine traveller with us, none of whom had seen it before.—*H. J. Taylor.*

DOG AND KITTEN.—I have a high-bred pet blue terrier, who has hitherto appeared to live entirely for his master, and was at any rate a terror to cats, &c. In our house we have made several attempts to keep a cat, but our dog Charlie would not consent. About a week ago, a poor, weak, nearly starved to death kitten, about two months old, walked into the house, and was taken by our domestic quietly into the kitchen. Some food and milk was given to it, and pussy was placed snug in the corner of the fireplace, out of sight of the dog; but it was not many minutes before he discovered there was a cat in the house, and instantly went in the direction where she was lying, in a great state of excitement and ready for fight. The kitten was alarmed, and stood up. To our surprise the dog, instead of attacking it, appeared to be instantly struck with its miserable appearance, and made no attempt to molest it. On the other hand, it showed evident signs of satisfaction, which soon convinced us that between the two there was a mutual understanding, for shortly after they were lying on the rug together. The same evening the usual saucer of milk was given to the dog, the cat followed the dog to the milk, and both lapped out of the saucer together. The cat-worrier and the kitten are now great friends. If this is not reason on the part of the dog, what is it? If it is at least sympathy, it is of a kind not often enough shown by those who claim the sole exclusive right to possess the higher quality.—*Alfred Tozer.*

BOUGAINVILLEA OR BUGAINVILLEA?—Having read in "Nature" of November 14 that the original use of catechisms was to give precision to oral religious instruction, I cannot think that there is any harm in an attempt to give precision to the teaching of science. Precision in the use of words is a quality not to be claimed by any writer who applies the term biennial to a cabbage. This is done in the first lesson in a little book on Elementary Botany by W. Bland, Master of the Endowed School, Duffield. It is nevertheless a very carefully written book, and that, nearly the only error which it contains, was probably the result of its author being misled by a similar statement in a Science primer by J. D. Hooker, C.B., P.R.S. The illustrious Director of the Royal Botanic Gardens, Kew, may be excused for not knowing that in my plebeian garden cabbages often live several years, and flower every season, which entitles them to be called perennial. Want of precision may be found sometimes in the orthography of generic names. One day last summer I saw and admired at a flower-show a plant labelled *Bougainvillea.* Wishing to know the Natural Order to which this plant belongs, I consulted the Index to Lindley's "Vegetable Kingdom," but found no such word. Having, however, by the kindness of a neighbouring gardener, gained possession of an inflorescence of the plant, I guessed from the examination of it that it might belong to the Order Nyctaginaceæ. Turning to Lindley's account of that Order, I found among its genera *Bugainvillea.* It would be nothing wonderful for a gardener's label to be inaccurate, but that on the plant in question could not be said to be so, as the name on it was identical with what is given in the "Official Guide to the Royal Botanic Gardens," by D. Oliver, F.R.S., F.L.S., Keeper of the Herbarium at the Royal Gardens, and Professor of Botany in University College, London. Of this authoritative Guide I happen to possess the twenty-sixth edition. I dare not presume to say it is inaccurate, but I should like to know whether the *Bougainvillea* mentioned in it be the same genus as in Lindley's "Vegetable Kingdom" is called *Bugainvillea,* and if so, whether in spelling the word I ought to follow Professor Lindley or Professor Oliver? So long as it remains uncertain, there can be no cause for apprehension that any catechism which may be written will give the precision of religious teaching to that of science.—*John Gibbs.*

THE HOUSE-FLY AND ITS PARASITE.—In the January number of SCIENCE-GOSSIP is an article on "The Development of the House-fly and its Parasite." Having given a good deal of attention to the house-fly, I am able to affirm that Mr. Robson has fallen into an error. The figure given is not *Musca domestica.* The antennæ are different, the eye is wrongly placed, the body is not the right shape, and the abdomen is

quite wrong. Moreover, the maggot figured is not the maggot of *Musca domestica*, neither is the chrysalis. Again, *Musca domestica* never lays its eggs on meat, nor will they, when hatched, feed on it, as far as I ever observed. The egg is much too large if only magnified 30 times, as the egg of *M. domestica* scarcely ever exceeds $\frac{1}{20}$ inch, which × 30 would be only $1\frac{1}{2}$ inch, while the figure is $2\frac{1}{2}$ inches full. In fact, Mr. Robson has been examining one of the flesh-flies under an error. If confirmation of my correction be required, I refer to Samuelson and Hicks, or, in fact, any work on the subject.—*E. Holmes.*

Double Orange.—In opening an orange by "peeling" it, I have just come across what, to me, is a novelty amongst the many oranges in the dissection of which I have assisted, aided by my little household of seven or eight persons, but probably is well known amongst your botanical friends. However, as it may interest some of your readers, I send you a few remarks on it. On turning back a portion of the peel I found to my astonishment, instead of the usual orange pulp with its thin cuticle, the yellow peel of a miniature orange, of a conical form, having on one side a very distinct seam or opening reaching from the base to the apex of the cone. That the infant orange was easily separated from the giant that had buried it alive within its own body was shown by the nature of the union between the two, gaps occurring between the woolly substance of the larger orange, and the similar covering of the base of the cone. On carefully inserting a penknife between the two I found that the complete form of the embryo, if I am right in using that term, was that of two cones base to base; but whilst that end which I have described as lying just under the peel of its consumer was covered with a peel of the same nature and colour, but more delicate in texture and of a lighter hue, the end which joined the body of the orange was imbedded in the usual white woolly substance but of a finer grain, but no yellow peel, except that it had a decided yellow tinge at its apex. I have said that the embryo separated easily from its matrix. There was, however, on one side a small tough aggregation of fibres, forming a sort of hinge, after all the rest of the looser fibrous matter was separated. Perhaps some of your botanical friends will be good enough to tell me if they would consider this to be the undeveloped fruit stalk. By the help of a pocket glass on removing the embryo entire, I found that the under part, by which I mean the cone-like end which touched the body of the orange, was covered with the usual vein-like fibres, only, of course, very minute; and most interesting of all the folding in process of the fruit leaf's development was very clearly shown. Dissecting the embryo the centre was found to consist of a small sac containing a few cells of the same shape as the orange pip, but they were pulpy and yellow.—*M. A. S.*

Intelligence in Man and Animals.—The anecdotes of animals which have from time to time appeared in Science-Gossip and other publications, and a little personal observation and reflection, would, I should have thought, have suggested to your correspondent, Mr. H. D. Barclay, that what is called *instinct* in animals often passes under the name of *reason* in man, and that the difference which exists is chiefly one of development. Mr. Barclay says: "The great difficulty in the investigation of the minds of animals appears to be that man instinctively and unconsciously, unless checked by reflection, explains their actions, especially in extraordinary cases, by his own modes and laws of thought." Perhaps Mr. Barclay will kindly inform us how else we are to explain their actions if we are not to use our "own modes and laws of thought." If an animal does precisely the same thing that a man would do under certain circumstances, are we not justified in concluding that animal and man are moved by the same power? Is not memory an act of reasoning? Is it simply instinct that induces a dog to starve itself to death on the grave of its master; or risk its life unbidden to save that of a helpless child? The wonderful feats that animals have been taught to perform, contrary to their natural habits, and the marvellous memory exhibited by many, are proofs, I think, that they are endowed with something more than mere instinct. The impression that the intelligence of animals differs from man's only in degree is founded on good evidence, and the difference between the intelligence of the beggar and the prince would in all probability be far greater than that between the beggar and his dog.—*A. C. Rogers, Red Lodge, Southampton.*

Glyciphagus plumiger.—In the July number of Science-Gossip, Mr. A. D. Michael announced the capture of a single specimen of this acarus, and after remarking on one in the possession of Mr. George of Kirton Lindsay, says, "we may, I think, fairly claim this as a British species, although only a single individual has been detected in each instance." I have been fortunate in capturing a large number, male and female, of this interesting mite, and as in the former case, they were found among the fodder in a stable in this city. As there is a considerable quantity of foreign hay used in this place, it is quite probable it may have been introduced, but the fact of its being alive and active, in the middle of December, during a very severe frost, shows that it is hardy enough for our northern climate.—*J. Lambert, Edinburgh.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

John Lambert (Edinburgh).—Many thanks for your excellently mounted slide of *Glyciphagus plumiger*.

T. R. Jones (Flint).—The fossils are:—1. *Producta Llangolliensis*, very abundant in the Carboniferous limestone rocks near Llangollen, North Wales; and 2. Fragment of fossil coral from same strata, called *Lonsdalia floriformis*.

H. L. Smith.—You will find the best account of our British newts in Cooke's "British Reptiles," published by Hardwicke & Bogue, 192 Piccadilly, at 6*s*. It gives a full account of *Lissotriton punctatus*.

H. Bangham.—We cannot undertake to give the name of a moth from a magnified drawing of one of the antennæ, although the structure much resembles that of the antennæ of the fox-moth.

W. Bennett (Hereford).—Your bat cannot be without ears. Perhaps they are very small, and, if so, it may be the whiskered bat or the barbastelle. You should show the specimen to some competent naturalist, as it is desirable to know more about our British bats than we do.

Tracy Appleton.—A good and cheap popular work on ornithology is that on "Birds" by Adam White, published by Routledge, at 7*s*. 6*d*. The same firm have also issued the "British Ornithology," by P. H. Gosse, at the same price.

J. N. D. (Tuxford).—We quite agree with you in your remarks as to Wood's work. The best book we know as a calendar is the Rev. Leonard Jenyn's "Observations in Natural History, with an Introduction on the Habit of Observing as connected with the Study of that Science, also a Calendar of Periodic Phenomena in Natural History." It is published by Van Voorst, at 10*s*. 6*d*.

New Cross Microscopical Society.—C. W. L. enquires for the place of meeting and name of the secretary of the above society. Perhaps some of our readers will answer him.

J. R. N.—Your little fish is the black goby (*Gobius niger*).

J. A. WHELDON.—Stark's "History of British Mosses," price 7*s*. 6*d*., published by Routledge; and Cooke's "British Fungi," price 6*s*., published by Hardwicke & Bogue, 192 Piccadilly.

ANY Cheltenham coleopterist who would be willing to assist a beginner in naming some specimens is requested to forward his name and address to the Editor.

PERCA.—Mr. Frank Buckland's "British Fishes," published by the Society for the Diffusion of Christian Knowledge, is a good introduction to the fishes of the British Islands. The volume on Fishes, published in Jardine's "Naturalists' Library" (Hardwicke & Bogue), is another good volume.

S. B. A.—Both jellyfish and sea-anemones may be preserved in a solution of picric acid.

W. G. PEARCE.—There is a microscopical society at Bath, and if there is not already a natural history society there, it is not for lack of workers and others interested in the study. We should think it would require little effort to found a society there.

R. H. W.—You will find full instructions for making artificial sea-water, &c. in Taylor's "Aquarium: its History, Structure, and Management," published at 6*s*. by Hardwicke & Bogue.

T. S. P.—The fossils are:—1. Head of Phacops, a silurian trilobite; 2. Portion of a cystidean, a peculiar form of sea-lily or encrinite; 3. *Atrypa reticularis*.

J. A. KAY.—In the answer to your question last month the words, "having the outline of your sketch," should have followed after the words, "more than fifty species of Navicula." There are more than one thousand species of Navicula known altogether.

J. FINNEMORE.—Mr. G. M. Gowan, of 20 Beauchamp Square, Leamington, writes as follows:—"I see by SCIENCE-GOSSIP for January that Mr. Finnemore (of Truro) wishes for Smith's 'Synopsis of the British Diatomaceæ.' I have a copy of it, two volumes, in boards, one or two plates, *loose*, but quite complete. I am willing to part with it, should it be worth Mr. F.'s while to offer a fair price for so rare a work."

EXCHANGES.

FIRST-CLASS human physiological and pathological microscopic slides, mounted by Hunter, in exchange for good British lepidoptera.—E. H. Jones, Rosslyn House, The Park, Ealing.

ACME LINEATA, *Vertigo substriata*, *Helix lamellata*, *H. aculeata*, *H. pygmæa*, *H. fusca*, for any *Vertigo Moulinsiana*, *Testacella haliotidea*, or *Geomalacus maculosus*, or any other good shells.—J. Whitwham, Cross Lane Marsh, Huddersfield.

ANATOMICAL sections wanted for well-mounted slides.—F. W. Edwards, 32 Hunslet Lane, Leeds.

FORAMINIFEROUS sand from Barmouth, containing many *rare forms*, in exchange for slides, material, or minerals.—J. W. Cotton, F.G.S., Barmouth.

WILL forward to anyone interested a copy of my new private exchange list for skins and eggs, compiled to facilitate exchanges and other useful purposes.—"Author," 11 Priory Road, Sheffield.

WILL give a collection of shells for any volume of SCIENCE-GOSSIP; want all years since commencement. Also want Turton's "Land and Fresh-water Shells."—Musson, 68 Goldsmith Street, Nottingham.

IN duplicate about 100 different species of the British land and fresh-water shells, including well-authenticated examples of *Vertigo minutissima*, *V. alpestris*, *V. pusilla*, *V. substriata*, *V. angustior*, *L. involuta*, *L. Burnetti*, *Succinea oblonga*. Desiderata: good (named) foreign land shells, or numerous species of British birds' eggs, many by no means rare.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

CRYSTALS of salicine or potassic chlorate, in exchange for other well-mounted slides.—Thomas Shipton, The Terrace, Chesterfield.

WANTED, a good ½-inch object-glass. Offered geological, physiological, and other slides, many suitable for polariscope.—M. Fowler, Burn Row, Slamannan, N.B.

OFFERED, Nos. 3, 38, 116, 173, 192, 206, 217, 355, 358, 384, 515, 548, 557, 667, 709, 1109, 1607, 1614, 1626, for other species.—D. J. Powrie, 3 Greenbank Street, Galashiels, N.B.

H. PYGMÆA, *C. minimum*, *A. tridens*, and many other species from North Wales, offered for good specimens of *Zonites cellarius*, *nitidulus*, *nitidus*, *glaber*, *alliarius*, or *excavatus*.—George Taylor, Mold, North Wales.

SCIENCE-GOSSIP, 1874, 1875, bound; having duplicates of these, will exchange for other books, pocket microscope, or natural history objects.—3 Belmont Villas, New Brompton, Kent.

BRITISH coleoptera, complete collection, male and female specimens of nearly every British species; 8000 specimens, mounted on cardboard, without pins (new style); correctly named. Particulars sent. Also collection of British birds' eggs, side-blown, labelled; well-marked specimens, 100 varieties. Also South African and American collections. Wanted, any foreign eggs. Send list.—Henry Sissons, Westbourne Road, Sheffield.

RARE European, British, and African eggs and skins. Full lists upon application. Wanted eggs and skins in exchange.—Sissons, Sharrow, Sheffield.

WANTED, specimens of Ophiocoma and *Coryne pusilla*; exchange.—3 Belmont Villas, New Brompton, Kent.

FORAMINIFERA from several localities, also zoophytes and mosses named and localised, well-mounted in balsam or damar; plant hairs, &c., for other slides or unmounted sections, &c., or offers in shells, &c.—Mrs. Skilton, London Road, Brentford.

WANTED, unmounted animal parasites, fleas, and ixodes, those from exotic animals preferred.—W. A. Hyslop, 22 Palmerston Place, Edinburgh.

IN exchange for good fronds of Fenestella from Silurian, Devonian, or Permian; offer carboniferous or Bala fossils.—G. W. Shrubsole, Chester.

OFFERED, American lepidoptera. Wanted, pupas of silkworm, death's-head, swallow-tail, emperor; eggs of *Bombyx Zamanii* and *Cinthya*.—T. Stock, 16 Colville Place, Edinburgh.

WELL-MOUNTED slides in exchange for good diatoms, mounted or unmounted.—Jas. Blackshaw, 78 Lozells Road, Birmingham.

WANTED, a good second-hand copy of Gosse's "Marine Zoology of the British Isles," in exchange for other works on natural history, or for cash.—G. N. W., 10 Edinburgh Place, Weston-super-Mare.

UNIO TUMIDUS, *U. pictorum*, *Anodonta cygnea*, *A. anatina*, *Valvata cristata*, *L. peregra*, var. *maritima*, *L. auricularia*, var. *acuta*, *L. glutinosa*, *A. Grayana*, *L. agrestis*, *L. marginatus*, *H. pomatia*, *H. hispida*, var. *alba*, *H. hispida*, var. *subrufa*, *A. acicula*, *C. myosotis*, and many other British species, for a copy of Rye's "British Beetles," or foreign shells.—Address E. R. F., 82 Abbey Street, Faversham, Kent.

A FINE series of trilobites (including the new Silurian forms, in exchange for microscopic rock sections.—Dr. Callaway, Wellington, Salop.

I HAVE several slides of interest to exchange for well-mounted objects. Lists if required.—T. Comlidge, 5 Norfolk Street, Brighton.

UNMOUNTED micro material in great variety, including highly interesting and beautiful marine objects, such as Foraminifera, zoophytes, sertularians, Echinideæ, Crustaceæ, Holothuria plates, diatoms, and *in situ* on Algæ in splendid condition; fruited Algæ, named, some prepared for balsam; marine Entomostraceæ and larva, &c.; and some very good slides of same. Wanted, first class micro and lantern slides. Particulars on receipt of stamped address.—T. McGann, Burren, Ireland.

A GOOD 24-inch four-draw telescope in exchange. Wanted, good slides, Slack's "Marvels of Pond Life," or other books on microscopic subjects.—S. C. Hincks, Runfold, Farnham, Surrey.

WANTED, transparent unmounted material in exchange for others, or Chinese natural curiosities, including insect architecture.—Tylar, 165 Well Street, Birmingham.

COLEOPTERA.—*Necrobia ruficollis*, *Timarcha coriaria*, *Agelastica hyalensis*, *Donacia sericea*, *Coccinella 22-punctata*, &c. for other species. Desiderata numerous.—Address, J. Wilcock, 85 Northgate, Wakefield.

L. C. 7th ed. Nos. 291, 334, 353, 556, 710, 841b, 911, 858, 958, 1059, 1270, 1323, 1430, 1441, 1446, 1447, 1471, 1516, 1537, 1614, 1619, and others, for 5, 10, 44, 135, 174, 191, 215, 228, 235, 348, 351, 360, and others.—T. Rogers, 27 Oldham Road, Manchester.

BOOKS, ETC. RECEIVED.

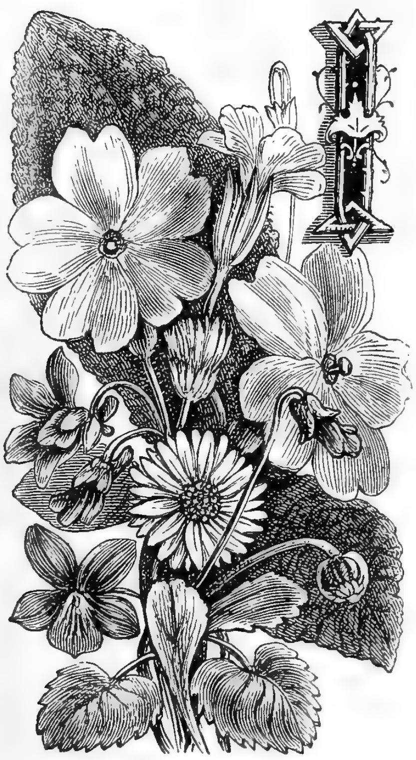
"Geological Stories." Fourth edition. By J. E. Taylor, F.G.S., &c. London: Hardwicke & Bogue.

"A Monograph of the Silurian Fossils of the Girvan District in Ayrshire." By Professor H. A. Nicholson and R. Etheridge, jun., F.G.S. London: W. Blackwood & Sons.

"Popular Science Review." January.
"Midland Naturalist." January.
"Land and Water." January.
"American Naturalist." December.
"Canadian Entomologist." December.
"Botanische Zeitung." December.
"Science pour Tous."
"Science News." (Salem, Mass.)
"Scottish Naturalist." January.
"Journal of Applied Science." January.
&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 12TH ULT. FROM:—W. B. H.—A. S.—C. R.—J. P. T.—Colonel B.—J. D.—G. C.—E. H. J.—J. S.—J. F. R.—M. W.—H. B.—H. N. B.—J. M. W.—R. W. W.—J. A. W.—F. H. A.—W. C. T.—F. W. S.—A. T.—C. F. W.—H. J. T.—H. H.—B. K.—J. I.—J. C.—G. O. P. C.—J. W.—M. A. S.—T. B. W.—E. W. M.—W. H. S.—A. J. J. B.—W. N. C.—K. D.—F. A. L.—D. J. P.—J. W. H.—S. B. A.—C. A. G.—H. U. J.—J. W. C.—F. L.—W. W.—W. G. W.—R. M. M.—G. H. L.—C. O. W.—M. F.—T. S.—E. B. F.—E. D.—J. H. G.—E. H.—W. B.—J. P.—W. S.—H. P. M.—J. B.—D. H. P.—F. L. St. A.—J. A. W.—T. S.—H. P. S.—G. W. S.—H. C. W.—H. M. P.—W. A. H.—M. S.—J. W. S.—A. G. R.—G. T. M.—H. S.—Dr. M. A. M. B.—J. A.—F. W. E.—G. D. S.—M. D.—J. W. D. K.—E. L. F.—G. T.—G. E. M.—J. W. C.—G. R.—T. L.—T. C.—W. G. P.—Dr. C. C.—S. C. H.—G. P.—D. D.—B. S. D.—E. D. M.—T. McG.—J. W.—W. T.—J. W. S.—G. M. G.—R. H. W.—T. R.—W. W.—&c.

NOTE ON PREPARING AND PRESERVING DELICATE ORGANISMS.*



It will not do to rely on the chemists and druggists of the south of France or the Italian coast for the chemicals requisite for researches in the natural history of those parts. If you go to these worthy folk and ask for what you want, they will stare at you and ask if you are a doctor, or what you intend to do. If you explain, they will gaze at you in astonishment, and perhaps ask to see your papers, and you will be lucky if they do not denounce you to the police! It is therefore necessary to carry all requisites with one. But liquid chemicals are bulky, and leaky bottles may stain the contents of the portmanteau; besides which the stock is soon exhausted. Crystalline substances, on the other hand, are easily conveyed, and contain in small bulk enough material to prepare and preserve a large number of objects.

The beautiful orange crystals of bichromate of potash form a very suitable solution for histological researches and for the preservation of delicate organisms. A few grammes of this salt, portable in any box, will meet all requirements. It dissolves in fresh or salt water, a few crystals saturating a large bulk. In this solution all the lower gelatinous animals, such as polypes, Hydromedusæ, Medusæ, Salpæ, ctenophora, &c., can be perfectly preserved. The shell-less mollusca and annelids, and all worms with tough skin can be kept in it. Small crustacea and bryozoa give also excellent results. We have kept a splendid *Medusa aurita* in this way for a whole year, and its beauty and transparency leave nothing to be desired. But this solution has one inconvenience, it permits the development of mould; but this can be prevented by the addition of a few drops of phenic acid or phenic alcohol.

For histological purposes it is as good as, but acts more delicately than chromic acid. It hardens the tissues, brings out the outlines of the cellules, shows their nuclei, and coagulates the sarcode. It is also a valuable agent in maceration, dissolving in most cases the intercellular cement and separating the parts. On this account only tough-skinned organisms can be preserved in it, lest the tissues fall to pieces. Still the most delicate parts of the vibratile cilia and infusoria are well preserved.

Another convenient and portable salt is permanganate of potash, a little of which goes a long way. It is especially good in histological researches, as it acts like osmic acid, burning up the protoplasm, bringing out the minutiæ, and showing the nuclei outlines of cells, &c. It is used as a saturated solution in distilled or very pure spring water. Sea-water also dissolves it. The concentrated solution, of a lovely violet colour, kills small organisms at once, and then burns them. They are left in it from thirty minutes to an hour, then withdrawn and placed in alcohol, after which they can be made transparent with essence of terebinth and mounted in Canada balsam. Beautiful results are thus obtained with echinoderms, zoophytes, worms, and marine arthropoda. For delicate researches, especially in the ciliated infusoria, it is better than osmic acid) without its great cost, and is everywhere easily obtained. G. du P.

Note by Translator.—Permanganate being deliquescent, and both salts highly coloured, wide-mouthed bottles will be found the best mode of conveyance; the corks being coated inside with beeswax or other protecting substance. The prices of the salts are, bichromate, 1*s.* 4*d.* per lb., and permanganate, 8*d.* per oz. W. H. D.

* By G. du Plessis, in "Bulletin de la Société Vaudoise des Sciences Naturelles," sér. 2, vol. xv. pp. 278–280, April 1878. Translated by W. H. Dalton.

NOTES OF AN AMATEUR ON SOME CANADIAN PLANTS.

THE pitcher-plant, *Sarracenia purpurea*, which grows in great abundance in our swamps and marshes, is said to be possessed of very valuable medicinal properties, as a mitigator of the severer symptoms of smallpox. I am not prepared to hazard an opinion respecting the properties thus claimed for it, but I think it probable that there are many plants, wild plants especially, whose virtues are still undeveloped; nor is it unlikely that it may have pleased the God of Nature to provide that our discovery of those virtues should be gradual and progressive, for the purpose of inciting us to persevere in our endeavours to increase our stores of knowledge, and thus to be constantly adding to the fresh disclosures ever coming to light of His wisdom and His goodness.

The pitcher-plant, belonging to the Order Sarraceniaceæ, is a semi-aquatic plant, belonging to the water-pitcher family, and luxuriates in moist situations; but I have grown it, although without signal success, in my garden, and, with better effect, in large pots or boxes filled partly with rough peat-soil and partly with sphagnum moss. I never found the leaves of the plant without cold water in them, even in the hottest weather, floating on which are invariably discovered a number of minute drowned or drowning insects.

There is a swamp, in the neighbourhood of this town, in which, in addition to pitcher-plants, are found many other interesting specimens of our *flora*, e.g. *Ledum palustre*, *Ledum latifolium*, *Kalmia angustifolia*, &c., plants known in England by the conventional term, "American Plants," and cultivated "at home" with great care and at considerable cost.

The milkweed, Asclepias.—This family is variously divided, by different botanists, into, 51, 36, and 22 species. The last is the American limit.

The spring-shoots of one of these plants, *A. Syriaca*, are used by the habitans of the Province of Quebec as an esculent; and the cotton, soft as down, concealed within its pods, forms, in some cases, the stuffing of their beds. This cotton is of peculiarly soft texture, and has, in consequence, been called "Virginian silk."

Another of the milkweeds, *A. tuberosa*, is a common plant in the county of Peterborough. It is a very showy plant, with bright orange umbellate blossoms. The English name of this species is the pleurisy-root. The family, as we are informed by Gray, derives its name from Æsculapius.

I do not think there would be much difficulty in cultivating the milkweeds with beneficial commercial results. The requisites would be a very light soil and abundant space.

New Jersey Tea, *Ceanothus Americanus.*—This is an ornamental shrub, growing to the height of from three to four feet, and embellished, in summer, with clusters of elegant white flowers possessing a faintly sweet perfume. The shrub dies down to the roots every winter. It has, not unfrequently, been used as a substitute for the Chinese leaves; but although by no means unpalatable, we Canadians cannot flatter ourselves that it will ever prove a formidable rival to either Hyson or Bohea.

It is, however, satisfactory to know that in the event of our supply from the Celestial Empire being at any time cut off, we may still indulge,—furnished by our own soil, for I have tasted the infusion,—in the "cups that cheer but not inebriate."

VINCENT CLEMENTI, B.A.

Peterborough, Canda.

PHYSIOLOGICAL CHARACTER OF FENESTELLA.

By G. R. VINE.

(*Continued from page* 276, vol. 1878.)

IN the study of the polyzoa—whether recent or fossil—two distinct characters are presented to our view: A true morphological, and a true physiological character. The morphology of the fossil polyzoa seems to come more fully within the descriptive range of the palæontologist than the other; but if the biologist is allowed to speculate when dealing with living forms, surely when dealing with the more ancient forms, sound physiological knowledge will be an advantage rather than a disparagement. Hence, in applying the results of modern investigation into the biology of the polyzoa, I have been guided in my selection more by the necessity on the part of the reader of the accurate appreciation of these results, than by the many and varied character of the investigations; some of which are too elaborate for general appreciation.

It seems to me then to be an axiom by no means inappreciable that the life history of the palæozoic polyzoa can form no exception to the life history of polyzoa generally. The definite forms of the one are as truly characteristic as the definite forms of the other. Among recent polyzoa no type exists bearing the close affinities with the palæozoic types, the nearest approach to the Fenestella being the Retihornera of Kirchenpaur. These, however, differ in many particulars—especially so in the mode of development of the cells along the sides of the fenestrules, and of the non-existence of a central keel. But the vital actions of the individual animals of the Retihornera were essentially of the same character as the vital actions of the animals of Fenestella. It will be well, therefore, to devote a few paragraphs to the record of the ordinary modes of propagation noticeable among the polyzoa, so that we may be able to appreciate more fully the value and the bearing of the facts which will follow.

According to Dr. Allman, the polyzoa have three distinct modes of reproduction. By buds or gemmæ, by true ova, and by free locomotive embryos.

The gemmæ or buds are developed on the body of the polypides: this always happens whenever the cells are in mutual apposition. If the cells are distinct they are developed from the connecting stem or stolon, as in the recent *Laguncula reptans*.

"The best examples" of the former mode "are furnished by the Flustra and their allies. From a single cell of the Flustra five such buds may be sent off, which develop themselves into new polypides around it; and these in their turn produce buds from their unattached margins, so as rapidly to augment the number of cells to a very large amount. To this extension there seems no definite limit, and it often happens that the cells in the central portion of the leaf-like expansion of a Flustra are devoid of contents and have lost their vitality whilst their edges are in a state of active growth."*

Since this was written the "dead cells" have formed the subject of many an excellent paper by Claparède, Smitt, Nitsche, and Hincks. The cells are not dead in a true and literal sense, for they often contain black or brown spots, supposed by Ellis (1755) "to be the remains of the animals once inhabiting these cells." These dark bodies are supposed—and their history has been accurately traced by Hincks—to be "germ capsules," and these may be characterised, if not as a fourth, at least as a very peculiar method of reproduction. This view, however, is opposed to that of Claparède who considered the "dark bodies to be the result of retrogressive metamorphosis of the original polypides which, under certain circumstances shrink back into this rudimentary condition, passing through the same stages in their decline as in their progress towards maturity, but in an inverse order." †

Reproduction by ova is the result of impregnation of the ova with the spermatozoa. Both the male and the female particles are developed within the same polypides, only situated in different parts of the body.‡ The embryo is first a hollow sphere, a layer is then thrown off from the surface at the same time that an opening is made in the wall of the sphere; a second sort of little sphere is thus formed within the first, and here little polypides are gradually developed.§ This development often takes place within the body of the parent, and their final discharge is by an opening situated beneath the tentacular circle.

I do not take into this account all the facts that have been promulgated respecting the reproduction of polyzoa by buds and by fertilised ova. A good paper by Nitsche, on the mode of reproduction of *Flustra membranacea*, is to be found in the "Quarterly Journal of the Microscopical Society," vol. ii. It is true, however, that not all the polypes are equally reproductive. In recent polyzoa, and in all probability in the fossil also, there were distinct centres of reproductive energy. These are the ooœcia or the ovicells of Busk and others. In some of the polyzoa the ovicells are separated from the ordinary cell structure and are developed in the axils of the zooœcia, or else by an inflation of the ordinary cell. Among the cyclostomatous polyzoa, the ovicells of Crisia and Crisidia are thus formed in the axils. The observations made on the ovicells of Idmoneidæ are scanty—but in the species called *Idmonea gracillima*, brought to light during the Porcupine soundings from a depth in the Atlantic at from 286 to 322 fathoms, the ovicells are pyriform like Crisia.

In *Hornera frondiculata* the ovicells are oblong and keeled—and in this and in several other species they are dorsal: while in *H. violacea* the ovicells are anterior either wholly or in part. They are unknown in Retihornera, but in Pustulopora they are tumid. In the Tubuliporidæ (Alecto and Tubulipora) the ovicells are represented by an uniform inflation of a part of the zoarium.

The ovarian cells of many of the Cheilostomata are cells situated among the ordinary cells of the polyzoary. They are known by certain characters and are easily distinguished by those who are in any way acquainted with the polyzoa. In the Salicornaria either a conical tooth or an elongated slit marks the ovarian cell. In the Membranipora, they are either triangularly marked, deeply immersed, or large and conspicuous. In Lepralia some are peculiarly punctured, or else globose. In Cellepora and Eschara they are either globose or else subglobose—except in *E. monilifera*, here there are no ovicells but what answers the same purpose—*fertile* cells, large, depressed, and irregularly placed. In Melicerita the ovicells are immersed, opening with a cresentic within the summit of the cell; while in Retepora there is either a vertical slit, or a large opening in front.

To the living polyzoa two very remarkable, but minute appendages are attached. One is the avicularia, or bird's head process; the other is the vibricula or whip-like spines. Much doubt exists as to the real function of either of the appendages. They are present in nearly all the Cheilostomatous polyzoa. In the Cyclostomata these appendages are rare—probably the vibricula are only found among the Crisia and the Crisidea—and as the carboniferous polyzoa are generally placed among the Cyclostomata it would be useless therefore to seek for these appendages. But there is strong presumptive evidence that in some at least of the Fenestella and Glauconome we may discover—either by inflations of the cells, or by gibbous masses clustering round the cell mouths, indications of one of the modes of reproduction prevalent among the carboniferous polyzoa. For specimens of these gibbous masses I have sought

* Dr. Carpenter, 1868.
† Hincks's "Contribution to the History of Polyzoa."
‡ See Dr. Carpenter, p. 578–9, "Quarterly Journal of the Microscopical Society," vol. xiii.
§ Dr. Ord, M.D.

very earnestly amongst my material, and I have been rewarded by finding some surrounding the cell mouths—others attached to the spiniferous processes of Fenestella, and some few attached to the spiniferous and infertile branches of Fenestella and Polypora.

To the Fenestella other small processes were attached, and wherever they exist they are generally developed, but not always, on the margins of the frond. Some of these are of a spine-like, or rather of a hook-like character: and these hooks are always turned towards the margin whence the processes are developed. On other parts of the polyzoary—sometimes in the front, sometimes on the back, other processes are developed, of a character altogether different from these spiniferous branches. These are the *Palæocoryne* both *radiata* and *Scotica* of Duncan. Singularly enough these have been placed among the Hydrozoa, and characters given by him to separate parts altogether at variance with the facts. Palæocoryne, however, are unique appendages, and they indicate another method of reproduction—peculiar to the fenestrate forms of polyzoa found in the palæozoic rocks. Neither the appendages of *Bicellaria tuba*, nor the anomalous ones of Bimeria in any way resemble—or serve similar purposes in the life-history of recent polyzoa—as was served by Palæocoryne in the ancient group.

The reproductive history of Fenestella generally seem to me to follow any co-ordinate type of the genus. The same character in the cell, the same idea prevalent in the Palæocoryne and in the spiniferous and infertile branches, and the same character of the bifurcations exist in one species as in the others; but there are certain peculiarities about *F. plebeia* that are apparently absent in other forms.

The corallum (or polyzoary), says M'Coy, was flat, expanded, and fan-shape; thickly carinated interstices, with thin and regular dissepiments. The fenestrules were equal and rectangular, from two to three times as long as wide, with a width equal to that of the interstices. There are four or five cell pores to length of fenestrule, with slight prominent margins, about the diameter of the cell apart. The reverse of the interstices are minutely granulated, and very coarsely sulcate longitudinally.

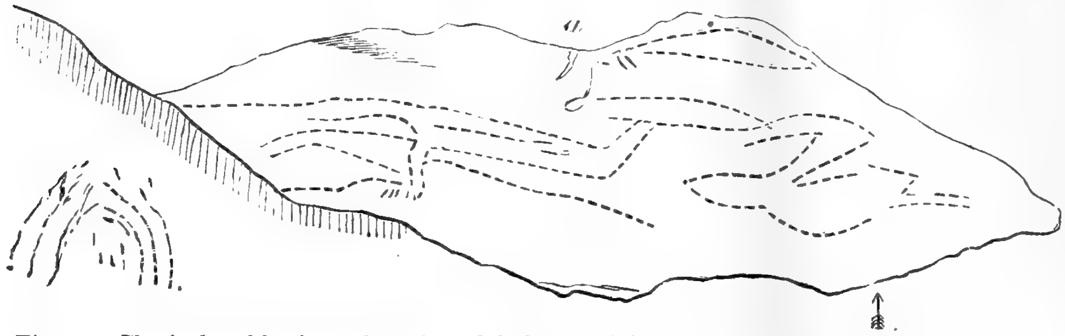


Fig. 42.—Vertical and horizontal section of shale containing *F. plebeia*, M'Coy. Natural size.

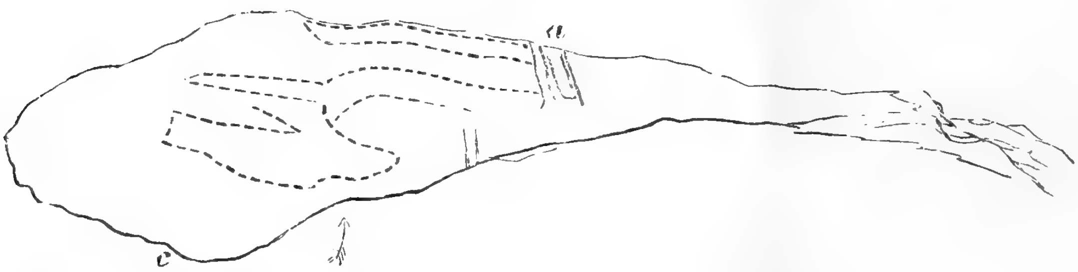


Fig. 43.—The broken edge of Fig. 1, reversed; the ↑ refers to the continuation on the same plane of the polyzoon—slightly different at *c*.

Fig. 45.—Spiniferous branch of *Polypora tuberculata*. (Hairmyres.)

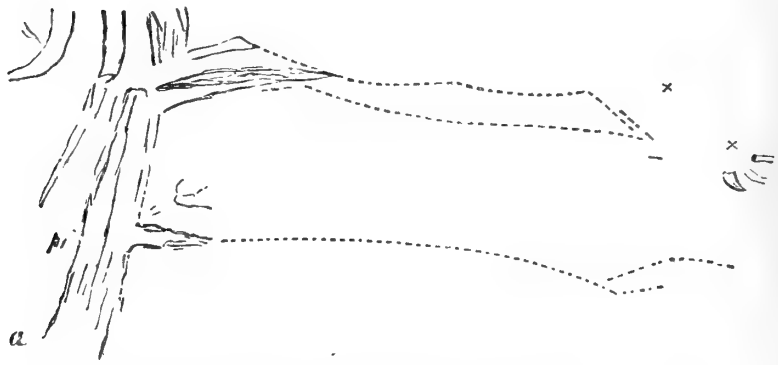


Fig. 44.—Enlargement of infertile roots and branches as at *a* in both figures, at ×, Palæocoryne, and infertile processes are developed, pointing upwards. Branches and root-like process slightly exaggerated.

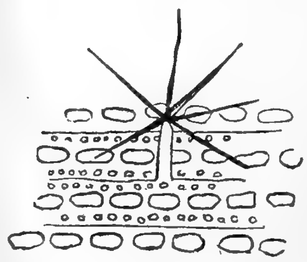


Fig. 47.—Diagram of Palæocoryne, showing that the Fenestella cells are continued along the base of the processes, and are not covered up by them. (By Mr. John Young.)

Fig. 46.—Sketch of branching spiniferous process on frond of Fenestella, from Cragenglen-Campsie, Scotland (four times natural size). By Mr. John Young.

I have before me the fragment of carboniferous shale from the polyzoa beds of North Wales (fig. 42). It is about four inches square, and the average thickness is about one inch. The specimen was sent to me by my friend, G. W. Shrubsole, F.G.S., and he had in his possession a slab even larger still, but unfortunately he has failed in other visits to the district of obtaining more of the same character. On breaking my own across the middle of Fenestella growth, for it I was let into the secret evidence that I have long sought for, and much more than I ever expected to obtain.

Fig. 48.—Infertile branch of *Polypora tuberculata*. (Prout, Hairmyres.)

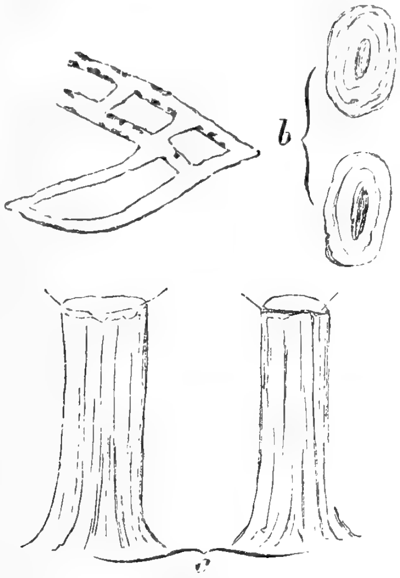


Fig. 50.—Palæocoryne attached to Fig. 51.

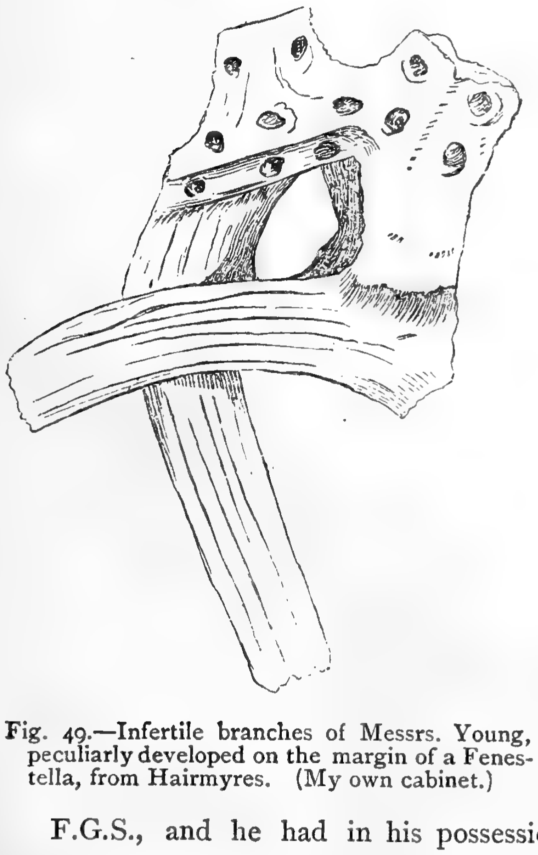


Fig. 49.—Infertile branches of Messrs. Young, peculiarly developed on the margin of a Fenestella, from Hairmyres. (My own cabinet.)

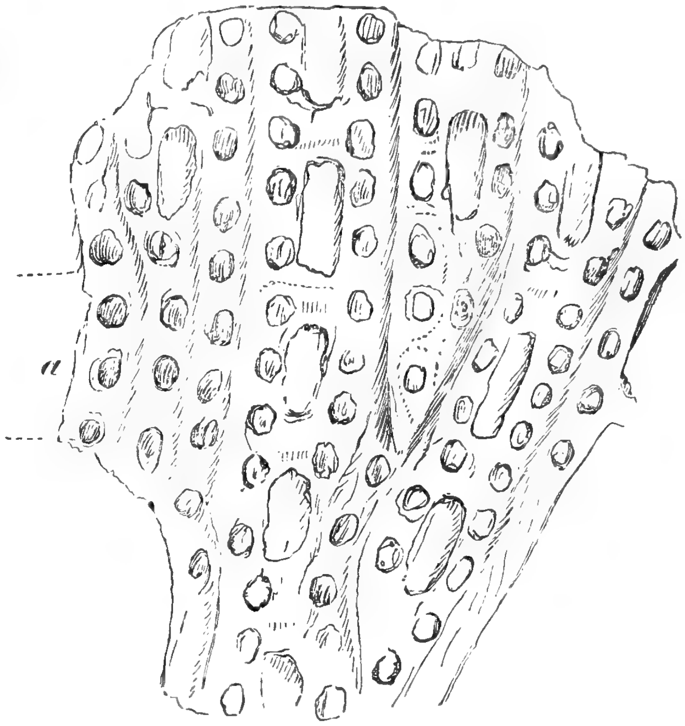


Fig. 51.—*Fenestella plebeia;* showing the interrupted development of the fenestrules; the entire absence of fenestrules at *a*, on face on the back are partially developed fenestrules of the character shown at *b*. Previous to being slightly rubbed down, Palæocoryne were attached of the shape and character of *c*. (In my own cabinet.)

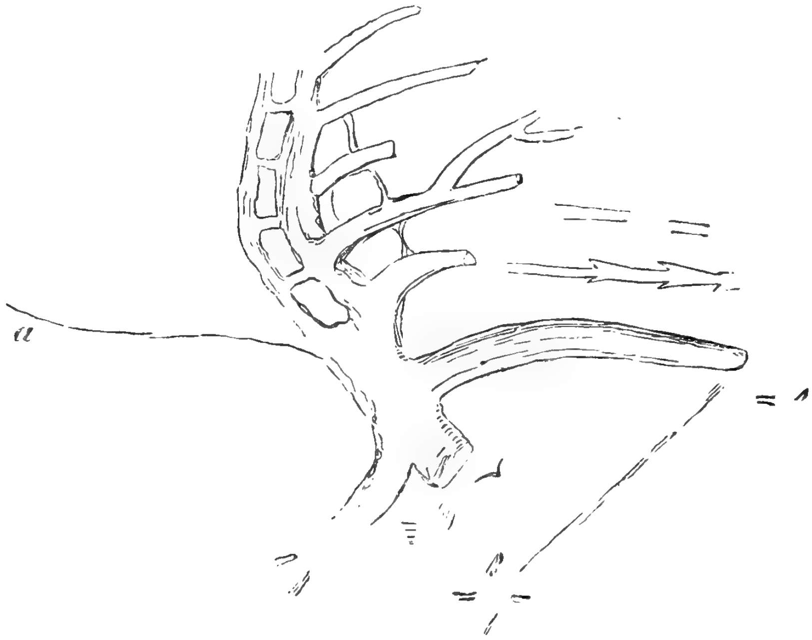


Fig. 52.—Processes from side of Fenestella. (Mr. Shrubsole's collection.)

The general idea of Fenestella growth is, that it was either cup-shape or flabelliform, springing from a rooted base similar to the recent Retepora or the Gorgonia. My belief is that this species at least was recumbent in habit, and that it began life on some fixed spot, and that from this point it gradually spread over the soft muddy bottom. Its development in one continuous plane, in either large or small fronds, was dependent upon the quantity of sediment held in solution by the waters above. It the water was tolerably fine and free from much sedimentary matter,

the fronds of *F. plebeia* would be correspondingly large; but if the waters were surcharged [illegible] shales, then these, falling upon the recumbent life form would soon bury itself out of sight. In the one case the frond would be perhaps from three to five inches square, in the other perhaps not more than one inch. The mystery of development is apparent in this recumbency, and we have no better example of the battle of life in the whole palæontology of the older rocks than is to be found in the life history of these palæozoic polyzoa.

During the last twelve months I have examined a vast number of the fronds of *F. plebeia*, and I find everywhere that the inequalities of the surface add to the grace of the Fenestella. Here there is a dead Productus,* there some fallen encrinal stems, imbedded in the mud. Over these the delicate polyzoa weave their beautiful polyzoary, adapting themselves gradually to all the undulations of the surface. Not, however, passing over the shell or the stem with that sharpness or splint-like character which would exist had the polyzoary been developed in an upright position—but delicately weaving their network even into the angles formed by the rounded stem as it lay in contact with the bottom. In no place is the polyzoary doubled upon itself so far as I am aware.

In figures 42 and 43, I have given an outline of the fractured shale of the natural size of my specimens. The continuous outlines are the shape of the block, while the dotted ones represent the exposed edges of the Fenestella. The marks in both figures are parts of the same polyzoary on the same plane, only one represents the right-hand fragment, while the other is the left-hand fragment reversed. There is a slight difference in the one that is not found in the other (*c*, fig. 43). At *a* in the two figures there are infertile processes of a root-like character, enlarged in fig. 44 to show their connection with layers of the polyzoary on certain planes. The character of these root-like processes will be considered further on. At the upper surface at point *a*, fig. 44, Palæocoryne is developed on the under part of the frond, and the poriferous face just at this particular point is much confused in character; portions of the branches, with several bifurcations, turning towards each other and meeting in a rounded form at the top. This, however is a peculiarity at this one point only, otherwise the frond is amply and admirably developed on other parts of the same plane. Here, at least, Palæocoryne serves the purpose, not only of the supporting of the polyzoary, but actually of passing over the reproductive power from one stage to another higher up, producing the uppermost dotted portion of the frond at *a* in figs. 42 and 43. From the peculiar character of *F. plebeia* at this point, I am inclined to the belief that this is only one of many points where this energy exists on the [illegible]ular plane. There was a disturbing cause, and this too has left its stamp upon the shale. A large productus settled down upon the polyzoary, burying a portion of the frond and forcing by its unpleasant presence either death or new development upon the polyzoa.

By the possession of these singular appendages, Palæocoryne, the colony was saved from destruction and development was carried on a stage higher up. In another piece of shale I have specimens of *F. plebeia, on two planes.* Here *Productus longispinus* is the original tenant, and where Palæocoryne passes over the life form from the lower to the higher, no confusion whatever takes place in development of the polyzoary; and in another specimen where there is no disturbing influence the frond, or rather the polyzoary, is beautifully developed, with that flat, expanded fan-like character noticed by M'Coy in his description of the species.

By the careful measurement of the exposed sections of Fenestella by the compass, on fig. 42, I obtain a length of about fourteen inches, and this multiplied by three, which is considerably less than the average, gives a surface of about forty-two superficial inches—an idea of Fenestella growth altogether different from that generally entertained as to the capacity of the genus.

Many of the earlier of Mr. Shrubsole's Welsh *Fenestella plebeia* I was inclined to place under the descriptive character of Phillips' sp. *F. flabellula;* but as specimen after specimen began to show characters altogether different from Phillips' diagnosis, I declined to place any more with that species. After breaking up my shale, I forwarded a small portion of it to Mr. John Young, F.G.S., of the Hunterian Museum, Glasgow, and he kindly identified the specimen as a fragment of *F. plebeia* (M'Coy). He also stated in his letter (July 7, 1878), that "It would be an interesting point to prove, in a satisfactory manner, that Fenestella and other kindred forms of fenestrated polyzoa grew in a recumbent method over the carboniferous old sea bottoms. One would be inclined to think, that from the small size of the roots compared with the large size of the fronds in many of the species, that the recumbent method was their natural way of growth." So far as I am acquainted with the subject there is no literature extant respecting this idea, and I believe Mr. Young is equally ignorant of any. The description and the figures of my slab will be, I believe, sufficient to prove the habit of the species, and any doubt respecting the true interpretations of the facts can be satisfactorily corrected by a reference to the fossils which I shall continue to keep in my possession.

I shall now take Palæocoryne in all its stages, and endeavour to identify the whole as generative processes of the fenestrate polyzoa.

Atterclife, Sheffield.

(*To be continued.*)

* Longispinus.

ON THE MARKINGS AND OTHER CHARACTERS OF BRITISH RAPTORES.

AN inquiry at p. 281 in SCIENCE-GOSSIP for December suggests that a few remarks grounded on observation of several species of hawks may not be unacceptable to young ornithologists. These birds being now rare in most districts, opportunities for inspecting recent specimens are not common.

The first description, referred to, seems to relate to a kestrel; the second—wanting an important item, viz., size, may concern a sparrow-hawk—but is too vague to support a reliable opinion.

Peregrines, hobbies, kestrels and merlins have long and pointed wings, the first or second quill being longer than others; they have also "the falcon's tooth," a process jutting downwards from either edge of the upper mandible.

Sparrow-hawks, which Markham and the *religieuse* of St. Alban's would have included with the goshawk as short-winged, have the fourth primary longer than the fifth, which exceeds the third, giving together rounder outline of wing and more lapwing or partridge-like flight. Sparrow-hawks, and the long-winged harriers, have a waved side edge to the upper mandible, the convexity being downwards and placed nearer the base than is the tooth of the Falconidæ, that forms their substitute for it.

Most hawks have increasing tendency to exchange dark shades for lighter tints, and the males of several species to assume a distinctly grey colour instead. Not only do individuals of the same species differ from others of like age, but do so themselves at different ages, and much confusion has thus been caused.

The female kestrel, and, if I remember, the young of both sexes, at first, exhibit a warm foxy brown of back, head and tail, the first part being freely sprinkled with black triangles. A long tail projecting more than an inch beyond the folded wings is barred all down; the halves of such dark traverses are not, however, exactly continuous with their fellows on the opposite web. The ground colour, in front, varies from a dirty white or yellowish grey to a rufous tinge; the breast markings on this are narrow, vertical, light reddish-brown splashes or streakings; below, these sometimes run together and expand, after the semblance of knotted cords, like the markings on the blue butterfly's scale.

The kestrel's head is elongated and flattened on the vertex; the beak is blue with black tip; the base being wide with yellow cere across it; behind this are many bristles. The eyes are large, dark and soft, with yellow edges to the lids. The slightly larger female after moulting retains her peculiarities, but the male gradually acquires a pretty lavender of head and pole finely streaked with vertical black lines; the back is then a richer cinnamon and with fewer black patches; the tail grey, with often only one bar; broad, terminal, and edged below with white. If, however, the tail feathers be spread, remains of barring may, perhaps, be found distributed irregularly and chiefly, or entirely on the inner webs—one single spot in several may be seen. A very fine female, in the writer's possession, has the ground colour of the tail approaching a faded grey, the marks much paler than usual, and the back cinnamon almost as brilliant as that usually seen in males. Well-padded, strong, feet are shorter proportionately than those of other falcons, the sparrow-hawk or harriers; and so are the tarsi, except those of the peregrine; the talons are straighter and shorter than in the species just mentioned; weight, male about 6½ ounces, length 13–15 inches, spread 27 inches. The much heavier female sparrow-hawk is, at least, an inch longer from beak to tail, but little wider of wing.

Young peregrines show a warmish but less red brown, and their breast markings, at this age, are mostly vertical and of the same hue; subsequently these are replaced by much darker, horizontal, chevron-like, traverses on breast, abdomen, and on under wing coverts—but quite the upper streakings pass into flask or tear-shaped spots, both becoming fewer and lighter with advancing age, until the breast shows nearly snow-white, a prong of which partly encircles the throat, gorget fashion—above the ends is a dark patch streaming back from either angle of the mouth; this peculiarity is more or less observable in other falcons. The mature, but still young, peregrine has the head, back and short tail of deep slate colour, closely blotched with bluish black, which at a short distance masks the general colour; both become lighter. The closed wings reach almost to the end of the tail, which is so folded that a sort of channel down it appears anteriorly. A fine female weighed 2 lb. 9 oz., measured 19 in., and spread 42 in. The flesh was hard and very red, the heart large and thick, the ligaments, aponeuroses, and tendons were tough; the feet very long, tarsi short and strong; the back toe and claw terrible. This bird was shot stooping at pigeons near a harbour mill; White's description and Morris's illustration tally closely with it. The only supposed Iceland falcon I recollect to have seen was higher, with longer neck, legs and tail, the latter extending much beyond the wings; the beak was carried further out and pinched in at the setting on, whereas that of the peregrine, expands widely there. The feet of the hobby and merlin have the relative length of a peregrine, but not the stoutness. The hobby's wings reach quite to the extremity of the tail; the facial patch is well marked; the breast streakings are bolder, broader, and darker than those of the kestrel or merlin; the tail of the latter is long, passing an inch or an inch and a half beyond the wings, and is barred freely with light-coloured traverses, they and the interspaces being nearly of equal width. The female is larger than the male; the brown colour is lighter than that of the sparrow-hawk, but less red than the kestrel; the

male, like that of the hobby and sparrow-hawk, becomes dark grey above and behind, with reddish sides of neck and breast. The merlin may be known in the air by exceedingly rapid, unswerving, pigeon-like, headlong flight, and by small size, and, when seen more closely by the falcon tooth, warm but not red brown and long tail, with numerous orange-brown traverses. There is greater difference of size between the sexes of sparrow-hawks than is the case with kestrels or merlins.

The sparrow-hawk's shanks are long, and the toes also; the former being, in the female, $2\frac{3}{4}$ inches long, the middle toe $1\frac{3}{4}$, the back one $\frac{6}{8}$th, and far stouter than the others. The long tail has a few dark bars carried straight across both webs, or meeting with a slight angle that looks upwards. The breast marking, and those of the abdomen and under wing coverts, are very similar to the peregrine's chevron, but lighter in colour. As the male gradually becomes greyish, with a reddish breast, the female adopts a softer brown and paler traverses; she has always a sufficient scowl, very different from the haughty aspect of the peregrine, hobby or merlin, or the wistful pensive look of the kestrel. Of three harriers one approaches the buzzard in appearance; another, owls; the third, in some respects perhaps, more nearly the kestrel, that is in lightness and length of wing, but it is wanting in the falcon tooth, and somewhat in strength of foot and leg. The young marsh harrier, or moor buzzard of Bewick, who gives an excellent representation of it, is of a deep brown, the colour of a dark brown red game pullet, but with some feathers laced at the edges by a lighter shade. The head alone differs in colour, and with a dirty yellowish-white cap. The beak is carried out and long, the feet strong, and the general aspect ferocious. The hen harrier has a slyer and more perky, softer look, with a distinct owl-like facial fringe or whisker; tall, long-legged, and upstanding, it has a long tail reaching far below the closed wings; the plumage is rusty and mealy, reddish or darkish brown, broken or streaked; the breast has vertical splashings; tail traverses, and interspaces are pretty equal, and perhaps mingled with white; a show of this on the tail coverts has procured the name of ringtail, assigned by Bishop Stanley to the goshawk. The vertex is round, and the head wanting in the length and breadth and over-hanging brows of the peregrine or kestrel. The spread of harriers is very considerable; I regret to have mislaid my own measurements. Colonel Montague's harrier, presumably the blue-hawk, with which the observant old naturalist of Selborne was acquainted (for he separately describes the peregrine sometimes thus styled), is an altogether lighter and more elegant bird; long with weaker feet and beak than those just spoken of; two Montague's harriers in the writer's collection differ much in colour; one has a decidedly rufous breast and dark plumage, richer and warmer than that of the female sparrow-hawk, and having here and there bright orange lacing to feathers; the other is larger and

Fig. 53.—The Kite *(Milvus regalis)*.

Fig. 54.—Sparrow-Hawk *(Accipiter fringillarius)*.

paler with dirty white breast and sparsely covered with long and wide tongue-shaped light *red* splashes, base upwards; this bird had, when spread, a very mottled appearance of wings underneath, caused by external marking showing through and barring the silver grey beneath.

The talons of harriers or sparrow-hawks, who are rather snatchers and pouncers, than swoopers and strikers, are proportionately longer, sharper, and more curved than those of most genera, but not so stout. The beaks of harriers, like those of buzzards, do not at once bend downwards, gradually forming a curve, but at first project outwards. They are narrower at the setting on than those of true falcons, but make up for this by greater depth—bristles and feathers at the base somewhat hide this part, but a side view reveals the true proportions. The harriers I have seen were chiefly obtained from uninhabited marshes of the shore line. The males of two species, at least, turn to a bluish grey, with much white underneath and in front. I have seen one such example, and heard of two; but in England this condition is now very rare. The goshawk formerly used for hawking in wooded places is still, it is said, much employed in India and China, &c. This large bird appears to have breast traverses, with dark brown back, &c. It was represented in the wholesale massacre at Glengarry which Colonel Knox records—and may yet be found in Scotland and Ireland as well as in France and Germany. I have never met with it.

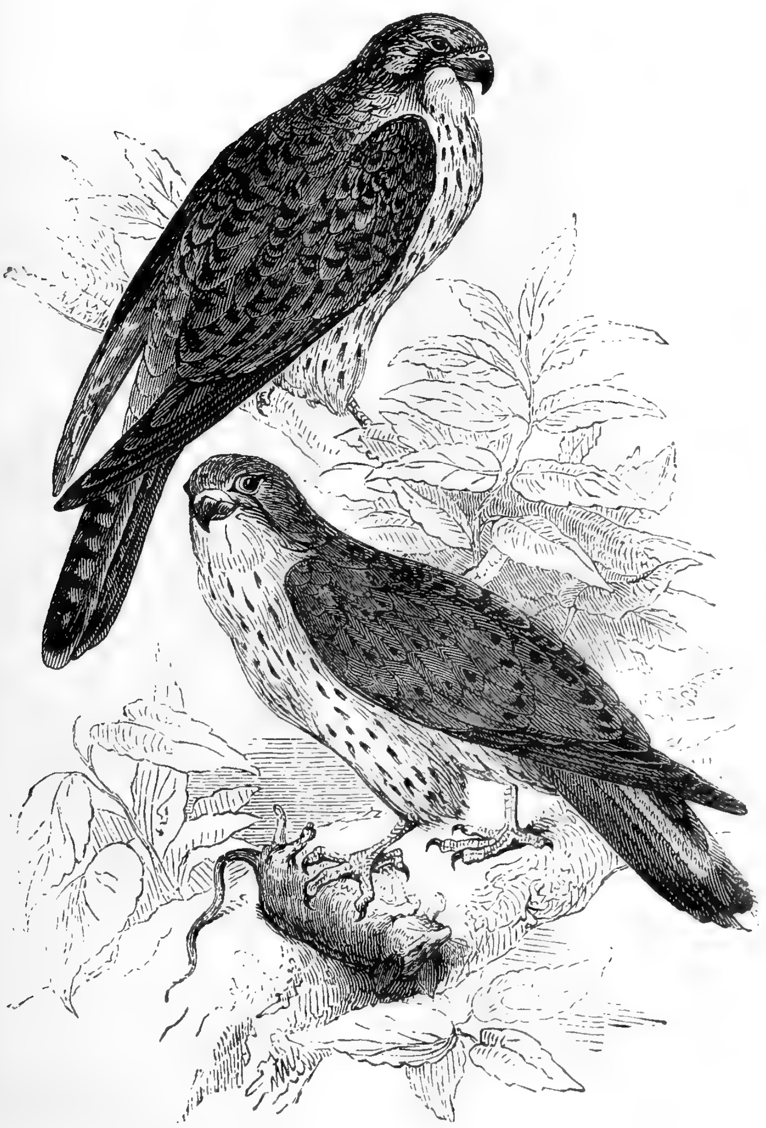


Fig. 55.—Pair of Kestrels *(Falco tinnunculus)*.

The three species of buzzards, also of large size and far less active than falcons, are occasionally seen; the honey-buzzard in dense woods. Two specimens of the rough-legged buzzard have come under my notice in three years, one at Arundel, and the other twenty miles west in the extreme south-west angle of Sussex. Feathered tarsi mark the species; one was much greyer on the back, and altogether lighter-coloured as well as smaller than the other, killed in October,

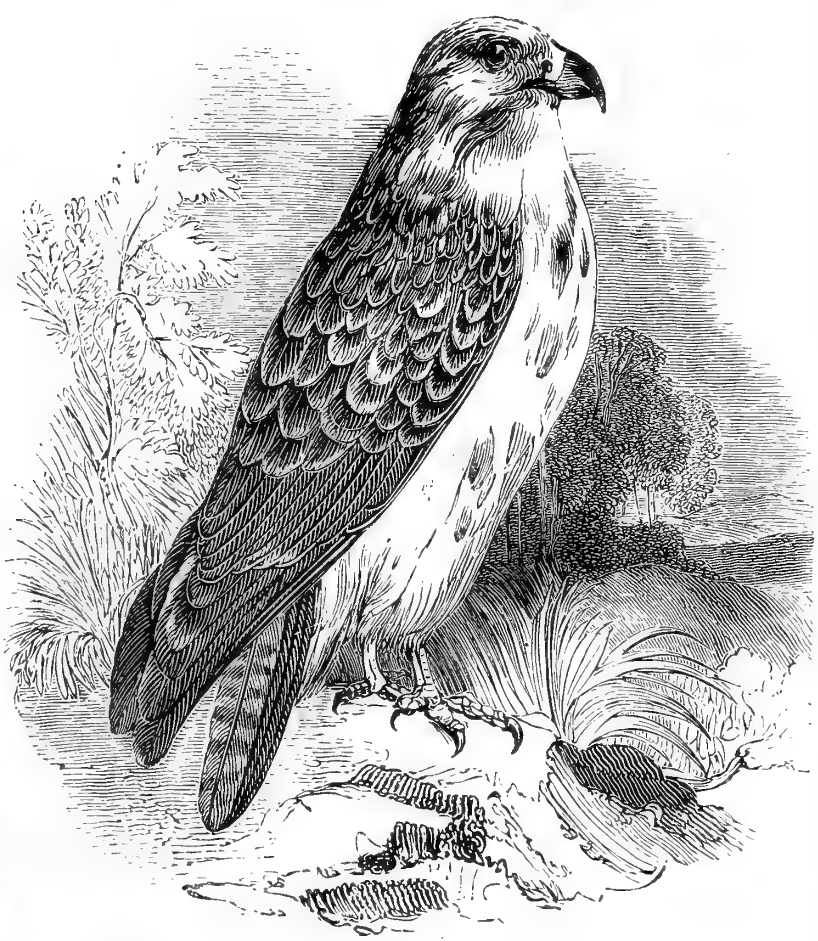


Fig. 56.—The Buzzard *(Buteo vulgaris)*.

1876. The latter measured twenty-four inches, was dark brown upon a lighter shade, giving large dark splashings on back and wings; tail whole brown, except at the sides towards the base; wings length of tail; head and neck showed lighter vertical streakings, and the breast more; dark upon a light reddish dove ground; much vulture-hocked, with light brown feathers having fine dark streaks, legs closely feathered, with the same pattern; beak and claws large, dark brown feet.

The common buzzard, it is stated, is rarer than the others. The Rev. H. D. Gordon, of Harting, has recently published a most interesting history of that neighbourhood, associated with many historical events, and Mr. Weaver, a resident gentleman, has added a very complete flora and fauna of a wild and beautiful district. This informs us that the common

buzzard is more often seen there than other species. Several specimens killed at that spot, within a score or two of years, are powerful, ragged, savage-looking birds, with broken, grey and white plumage, and tails considerably longer than the wings; no two were alike. The long forked-tailed kite has disappeared from the South of England, to the great satisfaction of all concerned in rearing young poultry, game, or pigs; these never being safe when once discovered by that audacious thief.

M. O. H.

ON MOUNTING AND PRESERVING THE LARVÆ OF BUTTERFLIES AND MOTHS.

WILL you allow me to describe my method of mounting and preserving the forms of the various moth and butterfly larvæ? What I have to say may perhaps be a help to some; or induce others who know a better plan to communicate it in return.

For the last three or four years I have been working out my own in my leisure hours; and, considering that I have been totally unaided, I think I may say that I have been tolerably successful. After seeing Lord Walsingham's fine collection of mounted larvæ at the Entomological Show held in the Royal Aquarium last March, I made up my mind to write to SCIENCE-GOSSIP on the subject. For I have long felt that our collections would be greatly increased in value and attractiveness by the addition of a nicely-mounted larva to each specimen of the perfect insect. The apparatus required is very simple, consisting only of a glass retort holding about about a quart, a foot length of india-rubber tubing about the size used for babies' bottles, a small piece of glass piping, and some dry straws of different sizes. Into one end of the india-rubber tubing fit a portion of glass pipe so as to make a mouthpiece: this we will call our blow-pipe. Then secure a well-grown caterpillar; which must be at least a week off the stage of becoming a pupa, for when that change is about to take place an amount of white fatty matter adheres to the skin, which it is almost impossible to get rid of, and which, if left there, spoils the preparation. Place this larva in a box and some chloroform or benzole with it; but take care neither of them touch it; having first covered the inside of the box with blotting-paper all round to absorb any of the dark green matter which often exudes from the mouth of larvæ when irritated or alarmed. When the grub is quite dead and slightly relaxed, take it out of the box and place it upon a sheet of blotting-paper, and gently pass a roller, made of a common pencil covered with blotting-paper, down from the head to the tail. By this means the entire contents of the creature may be expelled per anum without any damage to the skin. Next select a straw about the size of the opening through which the contents were discharged, and pass it into the body a short distance, and there fix it. This may be done by passing two small pins at right angles to each other through the extremity of the tail of the larva and the inserted straw, and then adding a little gum or glue round the skin of the caterpillar where it touches the straw on the outside which will make the whole air-tight. Now that you have your caterpillar fairly fastened on one end of the straw, pass the other end into the india-rubber extremity of your blow-pipe, and fix it there by a slight ligature. Putting the glass end to your mouth, blow gently into it, and you will inflate your larva, which will at once assume its natural shape, provided only it is not distended too much. Then light your Bunsen burner, and having moderately heated the retort, hold the larva thus inflated in the hot air of the retort till it is perfectly dry. Especial care must be taken that it is neither over-heated nor imperfectly dried, or before long the skin will become wrinkled or pitted. Now clip your pins off close to the straw and cut away the straw at the end of the caterpillar's tail: and your work is done. And if you have gone through all these stages carefully, it will be done very satisfactorily too, for the larva will be found to have lost little or no colour and to be in a very natural position. There is no need to trouble oneself at all on this last point, for each will assume that which is most natural in its own state of rest. The greatest difficulty I have experienced has been the preservation of the colour in the case of the light green ones, and I believe it to be impossible without the aid of some colouring matter or dye. For their colour is not in the skin, as appears from the fact that, as soon as they cleared out by our roller, the skin is no longer green but of a whitish hue. It had always been a great object with me to preserve their colour, and I looked upon its reproduction by means of paints as an illegitimate process, but I have been at last compelled to think it indispensable.

In the case of hairy sorts the utmost care is required to avoid destroying the hairs. But provided the grub is not too near casting its skin you may generally manage this by proper precaution.

I now think I have stated all that is necessary to the perfect carrying-out of my process.

I may, however, mention in conclusion one other way of securing the colours of the light green specimens; and that is by filling the emptied skins with strong alcohol coloured by dyes. The alcohol hardens the skin and colours it from the inside, which is more natural than if the colour were laid on externally.

WILLIAM BREWSTER.

NATURAL HISTORY CLUBS.—If any of your readers should have experience in connection with village Natural History clubs, or Botanical clubs, they would confer a benefit upon certain persons desirous to form such a club if they would kindly send a brief statement of the most advisable method of conducting them to *W. L. B., The Rectory, Pulborough, Sussex.*

THE POLECAT (*Mustela putorius*).

ONE morning during the past summer, I was taking a stroll before breakfast, when, going down a "shady lane," I was amused by one of our sturdy villagers shouting out as loud as his famous lungs would permit him. "A fitchett," "a fitchett," "a fitchett just gone down the marsh." Thought I, what can the man mean? Acting upon the thought, I stopped him to inquire, when I was roughly answered, "A fitchett dunno' ye know; well, then, I canna' tell ye." Of course, all this was excused, for my friend was quite wild with excitement. Scarcely knowing for the moment what to do, I did what I conceived to be the best, joined in the eager pursuit, along with a score of lads and men, as fast as our legs could carry us. At length panting, and out of breath, I jumped with the rest over a five-barred gate, and entered a meadow to find my fellow villagers pursuing a dark looking animal along a thick edge. Before proceeding further in my description of this Cheshire hunt (you know we are noted for hunting in the cheese-making country), permit me to add by way of excusing my conduct, in joining in the chase, that I was really anxious to know what a *fitchett* was. It might be a large animal, just escaped from a strolling menagerie, so it was important that the village should be speedily free from its presence.

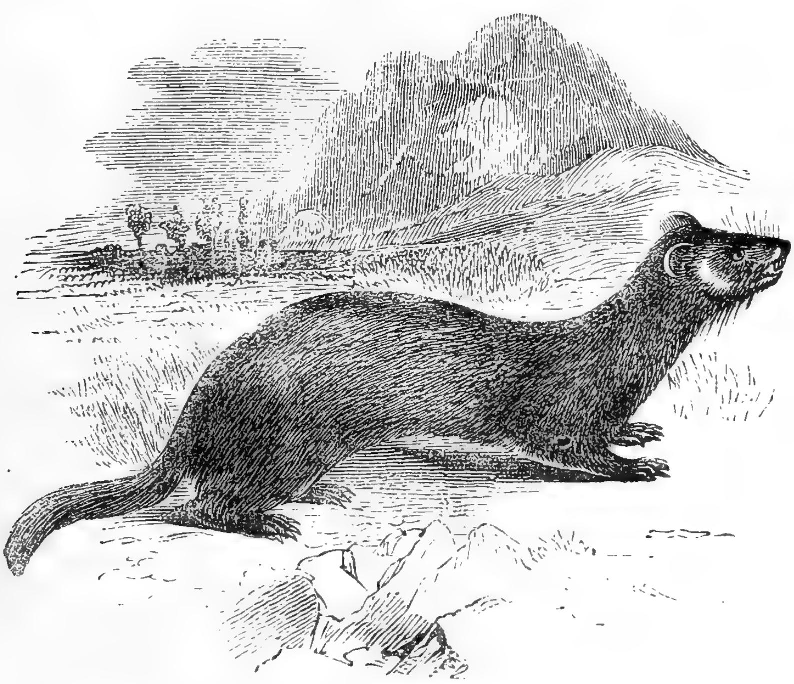


Fig. 57.—Polecat (*Mustela putorius*).

However, I at length caught a glimpse of this intruder on the peace of our quiet village. It was a long and elegantly shaped animal, of a rich black colour along the back. The chase continued with considerable excitement for almost half an hour. The animal had the advantage over its opponents, by being sheltered with the thick hedge bottom—it dodged first to one side, then to the other, until it was evidently weary; then making a spring for liberty and life, it was most humiliatingly held fast with a large shovel tightly laid over its loins. The next question was, should it be at once killed or preserved alive? The majority voted for a kind treatment, so a boy was despatched to the nearest farmhouse for a bag, in which to carry it safely. To make a long story short, we soon had our captive in a large barrel, where it was kept for a few weeks, until it was purchased by an exhibitor.

I learned what I wished to know when I 'leg or nothing' joined heartily in the hunt. The fitchett was a polecat, an animal not at all common in this county, and I gained my knowledge, not by hearsay evidence, but by my olfactory nerves, for no sooner was the captive held tightly under the labourer's spade than we were regaled by a most horrible stench. Talk about bone-works in active operation, it is a pleasant perfume when compared to the polecat! Another point was learned. The habits of this animal in captivity were so similar to the ferret that I have now no doubts the latter animal is a domesticated polecat. Of course, by continued breeding in-and-in, to use a live-stock phrase, it is now weakened, as well as puny, compared with its original parents from the "wild wood."

I account for the common or local name "*fitchett*" from the fact that the long shining hairs are used to manufacture the brushes used by artists, under the name of *fitch*, or *fitchet;* we thus perceive the name is not far-fetched. The colour of the polecat is a deep blackish-brown; the head, tail, and feet almost black; the under parts yellowish, the ears are edged with white, with a whitish space round the muzzle. The hair is of two kinds,—a short woolly fur which is pale yellow, or somewhat tawny, and long shining hairs of a rich black, or a brownish-black colour, which are most numerous on the darkest parts.

For the unpleasant odour exuded from the animal, we find a pouch, or follicle just under the tail, which emits a yellowish, cream-like substance, of a very fetid odour; this is particularly strong when the polecat is excited or irritated. It is an active little animal, scarcely ever idle, and never still, except when it is asleep, and it is one of the best friends a farmer can have about his premises, if he can keep it away from the hen-roost, for it is very partial to poultry, and commits great destruction if the game is plentiful. It destroys the latter solely for the brains and blood, for the birds are never torn or mangled. It is however, indefatigable in its pursuit of rats, and its presence in the rickyard is quite sufficient to drive away all the vermin.

Another local name for the polecat is "*foumart,*" by many supposed to be a corruption of *foul marten*, in allusion to the odour it leaves behind. From its

long, agile body and bushy tail, it bears a close resemblance to the weasel and stoat; thus it is sometimes referred to the same genus.

It also has the same pugnacious disposition as the weasel, for we have a record from Delamere Forest of a fierce encounter betwixt a female and a gamekeeper. It appears the man had taken its young to destroy them, when the mother came too quickly on the scene, and attacked the keeper. The fight continued nearly an hour: the polecat came off victorious, for it escaped with its young, but the man was led home blinded, and with his features lacerated in a dreadful manner. Our hunt ended far more happily, for we secured the poor "*fitchett*," which has furnished us with the text of the present narrative.

R.

ON THE STAMENS OF *SPARMANNIA AFRICANA*.

SPARMANNIA AFRICANA belongs to the Tiliaceæ, or Lime-tree order, this genus being a native of Southern Africa. It grows there as a small shrub, one foot or eighteen inches high, with coarsely serrate, downy, heart-shaped leaves, and umbels of handsome white blossoms. Each flower consists of an inferior polysepalous calyx of four white silky sepals, a hypogynous polypetalous corolla of four white petals, numerous hypogynous red and yellow stamens, forming a globular bunch, in the midst of which is the style, rising from a superior many-celled pistil. The carpels are studded with tuberculated hairs, very much like the glandular hairs of the stinging nettle, but without the curved tip. The pedicels exhibit a peculiarity which I do not remember to have seen elsewhere. About one-third of an inch from each flower there is a joint, not very conspicuous, but still easily seen, where the flower-stalk gives way on being pulled.

But the stamens form the most interesting part of the plant. I have figured a few in order to convey a better idea of their structure, by which it will be seen that their filaments are more or less enlarged by growths which sometimes take very fantastic shapes. Puzzled at first to know what could be the use of these formations, I not unnaturally expected to find that they were in some way connected with the process of fertilisation; but it was difficult to see how this could be so, and moreover the great diversity of form in the irregularities seemed to negative such a supposition. On a closer examination, however, and on sketching the stamens, I am inclined to think that this is a case of abortion accompanied by an extra formation in consequence of such abortion; that is to say, that the anther being in many cases absent or imperfect, the energy of the stamen, diverted from its usual object, has spent itself instead in this unusual manner. To this conclusion I have been led by observing that the extent of the malformations varies in the different stamens just in proportion, roughly speaking, to the abortion of the anther; and also that the outgrowths are largest at the end of the stamen where the anther would have been, and diminish in the other direction. That this is the case will appear from the specimens figured, which are fair examples of the rest. The antheriferous stamens occupy by far the larger portion of the group, being found in the centre around the style; while the abortive stamens are found towards the edge of the group, forming a ring around the others. The latter are comparatively short and are entirely yellow, while

Fig. 58.—Flowers of *Sparmannia Africana* (natural size).

the former are longer and bright red for the upper two-thirds of their length; the two kinds merging gradually into one another. This position of the abortive stamens is just that in which they would be of least use to the pistil even if they had anthers,

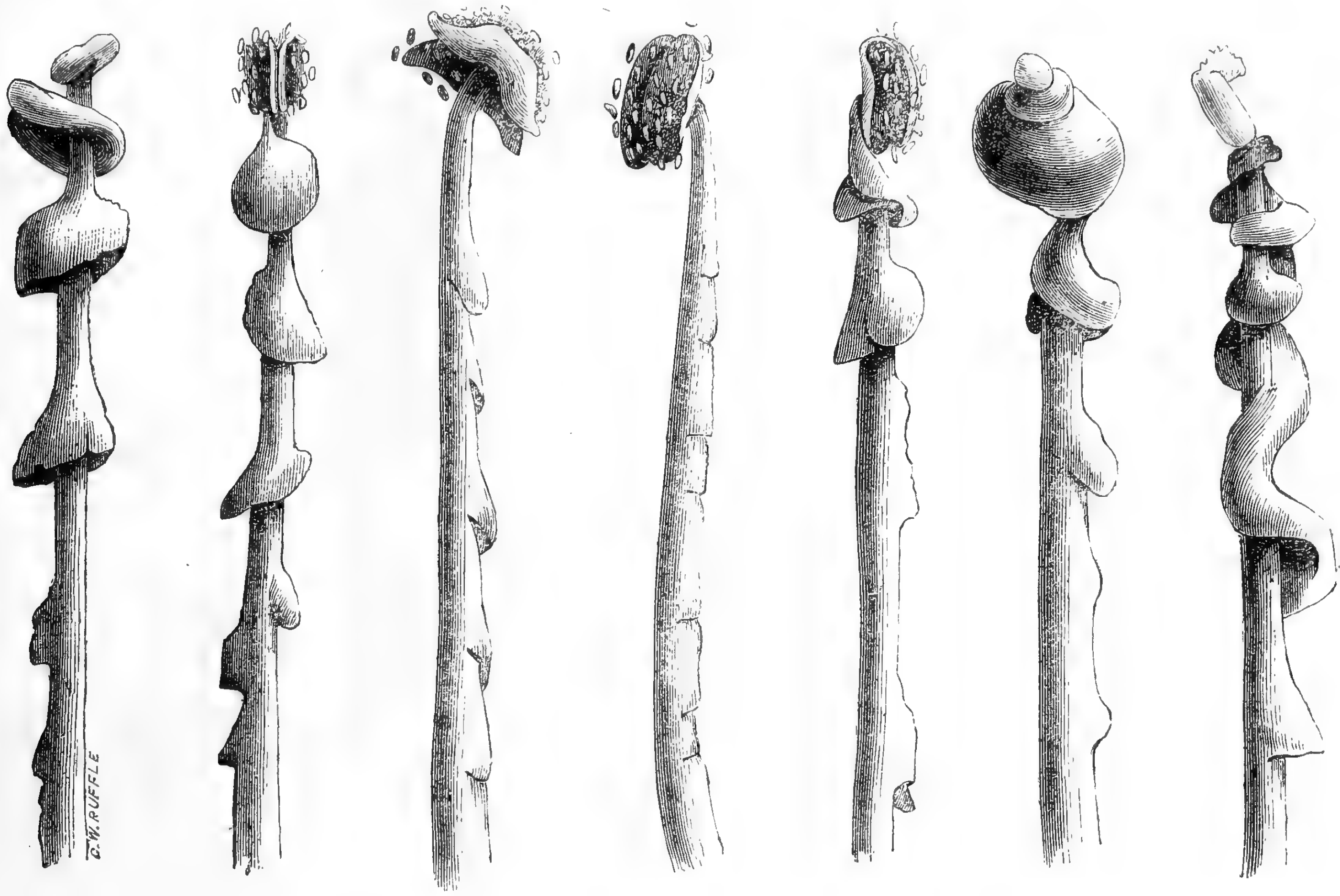


Fig. 59.—Stamens of *Sparmannia Africana* (magnified 15 diameters).

supposing the flower to be self-fertilising; while it is also here that the stamens would be most likely to undergo metamorphosis into petals.

As one might expect a flower with so many stamens to have a tendency to become double, it would be interesting to know what would be the effect of cultivation, and whether the malformation would advance inwards as the outer stamens were converted into petals. It may be that instead of becoming petals, the outer stamens would produce still more extraordinary forms.

I am indebted for the specimen I have figured to J. W. Morris, Esq., of Bath.

New-Kingswood, Bath. JOHN W. BUCK.

MICROSCOPY.

CAVITIES IN QUARTZ.—The observations made upon the liquid-cavities in the quartz-bearing rocks of the Lake District were made from thin slices of the rocks prepared for me by Mr. Cuttell, under the superintendence of Mr. Jordan, of the Museum, Jermyn Street. Mr. Jordan has invented a special form of machine for the purpose. I would refer readers of SCIENCE-GOSSIP to my paper in the "Quarterly Journal of the Geological Society," vol. xxxi. p. 568, 1875.—*J. Clifton Ward.*

A NOVEL AIR-PUMP FOR REMOVING AIR BUBBLES IN SLIDES.—A is a frame made of wood or metal; B is an india-rubber pipe; C is a valve made by closing one end of a piece of glass tube, and then drilling a small hole as shown in D, then slipping over it a small piece of india-rubber tubing as shown at C. The top of frame A should be made perfectly true, and then coated with tallow and a piece of glass

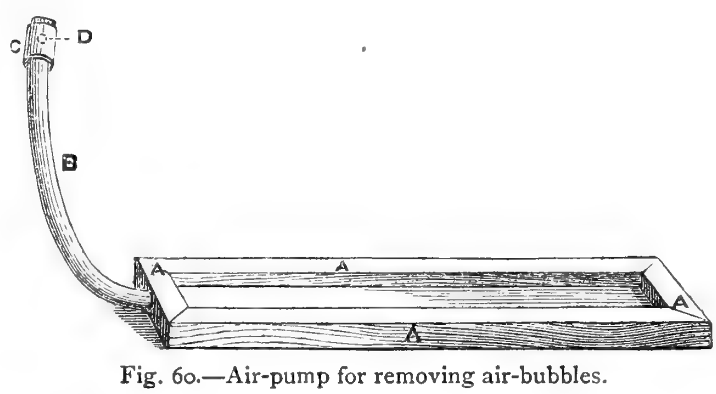


Fig. 60.—Air-pump for removing air-bubbles.

laid upon it. The air is exhausted with the mouth at C. I find with this handy little instrument I can get sufficient vacuum to remove any air bubbles that might have formed in my slide. Mr. Atkins, of 200 Essex Road, Islington, made my instrument, and I think he is now making them for sale.—*A. Smith.*

HOW TO REMOVE CANADA BALSAM FROM SLIDES.—I know that microscopists sometimes find it difficult to remove Canada balsam from old slides, or unsuccessfully mounted ones. I have always found the following plan a very good one: Place the slides in

an oven for two or three days, the Canada Balsam will then easily chip off with a knife, then wash them in soda water.—*S. C. Hincks.*

New Forms of Camera Lucida. — In the December number of the "Bulletin de la Société Belge de Microscopie," Dr. Henry van Heurck describes a new form of camera lucida, invented by D. T. Hofmann (29 Rue Bernard, Paris), the well-known optician. This camera lucida not only shows the pencil with great distinctness, but every detail of the image. Every one who uses the camera lucida is annoyed at the uncertainty that accompanies the ordinary apparatus, particularly when it is necessary to reproduce delicate details, as, for example, the markings on diatoms. With this new instrument these fatiguing adjustments are avoided, and we feel sure that it will be cordially welcomed by the micrographer. The construction of the Hofmann camera lucida will be understood by the subjoined diagram. It will be seen that it consists of *c*, a combination of lenses. The image is received by a silvered glass, *a*, and is reflected upon the second glass, *b*. *e* is a small aperture, through which not only the image in the mirror can be seen, but also the pencil and paper. *d* are two very slightly convex lenses, which may be used together or separately; they serve the same purpose as those on the ordinary forms of camera lucida. The Hofmann camera lucida is really a "camera lucida ocular," the inventor intending it to replace the ordinary ocular.—*F. Kitton.*

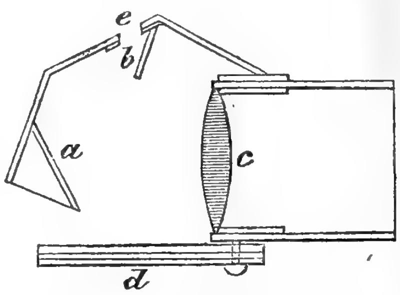


Fig. 61.—The Hofmann Camera Lucida.

Journal of the Royal Microscopical Society. —Some twelve months since the Society was informed by the publishers of the "Monthly Microscopical Journal" that in consequence of that work not being a pecuniary success, the arrangement existing between them must terminate. The Society thereupon determined to follow the example of other societies and publish their own Transactions. In accordance with this resolution, the first part made its appearance in March, 1878, a part being published every alternate month. We have now before us the first volume and part i. of the second. Volume i. contains 402 pp. of letter-press, 17 plates and many woodcuts. The names of the contributors of original papers guarantee their value.

The following gentlemen have already sent papers: H. Sorby, F.R.S., &c. (Presidential Address); Carl Zeiss, Jena; Adolph Schulze, Glasgow; J. W. Stephenson, F.R.A.S.; G. G. Stokes, M.A., D.C.L. Oxon., LL.D. Dublin, &c.; Professor R. Keith; F. H. Ward, M.R.C.S.; F. H. Wenham, F.R.M.S.; F. Crisp, LL.B., B.A. &c.; Professor Owen, F.R.S. &c.; Dr. R. Pigott, M.A., F.R.S. &c.; H. J. Slack, F.G.S.; Dr. H. D. Schmidt, New Orleans, La.; M. P. Petit, Paris; Rev. W. H. Dallinger.

Amongst the important original articles we would especially direct attention to the following, "On the Measurement of the Flagella of Bacterium, a Contribution to the Question of the Ultimate Limit of Vision," by the Rev. W. H. Dallinger (2 plates). It has been asserted that any object whose dimensions were less than a half-wave length of white light, was incapable of being seen, however much our objectives were improved in their revolution or definition. In fact, that light was too coarse a medium for objects less than $\frac{1}{92364}$ inch in breadth, that being the length of half a wave of white light; supposing the blue rays were used, the dimensions might be reduced to about the $\frac{1}{112000}$ inch without becoming invisible.

The Rev. W. H. Dallinger, with the careful manipulation for which he is so justly celebrated, has not only been able to see the flagella on *Bacterium termo*, but has succeeded in accurately measuring their diameters, and he finds that the mean of two hundred measurements is nearly $\frac{1}{204700}$ inch, being much less than a quarter-wave length of white light. Mr. Slack, F.G.S., the present president, communicates some interesting observations "On the visibility and optical aspects of Hairs viewed from a distance." He finds that a hair $\frac{3}{1000}$ inch in diameter when stretched on a pane of plate glass and viewed against a white sky, was seen by several persons at a distance of thirty-four feet, and under special conditions at a much greater distance. In the February number Dr. Royston Pigott, M.A., F.R.S. &c., has a learned and valuable paper on a similar subject, viz., "The Limits of Microscopic Vision." In this paper he very much increases the limits of visibility, but we must refer our readers to the paper itself, our space only permitting this brief notice of it. Professor Owen in his article on the microscopic structure of the fossils called "granicones" (2 plates), shows with great probability that these bodies are the dermal scutes of some Lacertian reptile resembling the recent *Moloch horridus* of Australia. Associated with these remains are the bones of marsupials. The "granicones" occur in the "Featherbed" stratum, Middle Purbeck, Dorsetshire. Those interested in the study of the Diatomaceæ will read with pleasure M. P. Petit's description of new diatoms from New Zealand and Campbell Island (translated by permission of the author, with notes by F. Kitton). It is illustrated with two plates of figures. The notes and memoranda form an important part of each number. They are selected (and where necessary translated) from the current literature, English and foreign; the ordinary microscopist is therefore kept "posted up" in the most recent labour of foreign observers. In the bibliographical division we have first a list of microscopical works recently published (English and foreign); second, an index to the contents of the various

scientific serials, English, French, German, and American, in so far as they relate to microscopical matters; as this division occupies eight closely-printed pages, our readers well understand that it contains no ordinary amount of information. The editorship has been undertaken (as an honorary office) by one of the secretaries, Frank Crisp, LL.B., B.A. &c.

ZOOLOGY.

THE WEATHER AND THE BIRDS.—Under the above heading, a paragraph appeared in SCIENCE-GOSSIP for February (p. 40), in which it is stated that a golden eagle was shot at Fritton, and another seen at the same time which escaped. The bird in question was wounded and taken alive, and is now in the Yarmouth aquarium, where I saw it a short time since. It certainly is not a golden, but an immature white-tailed eagle. Individuals in the same stage of plumage occur along the east coast almost every autumn or early winter, and are as invariably recorded as golden eagles. The only authentic instance of the occurrence of the latter species is that recorded by Mr. Stevenson in the "Zoologist" for 1869, but the white-tailed eagle, as before stated, although in the mature plumage excessively rare, is in the immature dress by no means a rarity. In order to distinguish between the two species in any stage of plumage, it is only necessary to remember that the tarsi in the golden eagle are feathered to the toes, and the first joint only of each toe is covered with broad scales, whereas in the white-tailed eagle the whole length of each toe is covered with broad scales and the tarsi are bare. —*T. Southwell, Norwich.*

KILLING AND PRESERVING REPTILES.—In reply to Mr. Alfred Wheldon's inquiry, I beg to say that the best way to kill a small reptilian or batrachian is to put the animal into a phial which is of just sufficient size, together with a piece of folded blotting-paper, saturated with chloroform, and then place the bottle for a few minutes out of the sight of ladies and children. Death will speedily result from asphyxia. The specimen should then be preserved in methylated spirit, which may be diluted to the extent of, say, 25 per cent. with water. The addition of the water will very likely make the liquid thick with air-bubbles, but these will disappear in a few hours. The most convenient and inexpensive bottles are "boxwood-topped kali bottles," or, for rather larger specimens, "one pound wide-mouthed stoppered rounds." Both may be obtained of Messrs. S. Maw, Son, & Thompson, 10, 11, and 12 Aldersgate Street, E.C., or through any obliging chemist. It is not usually necessary to secure the specimen with a thread. Lizards and newts should be preserved head downwards.—*R. Morton Middleton, Jun.*

THE NIGHTINGALE IN YORKSHIRE.—As Mr. Ingleby has indicated the nidification of the nightingale, *Philomela Luscinia* having taken place in Yorkshire, the following facts may prove interesting both to him and other readers of SCIENCE-GOSSIP. In the summer of 1877, a pair of nightingales built their nest in the shrubbery of a gentleman residing near Beverley. Of course the occurrence attracted considerable attention, and it was freely discussed in the local papers. I am glad to say, however, that, notwithstanding the general publicity thus given to this remarkable fact, the young were hatched and reared without any further disturbance than that occasioned by the pardonable curiosity of onlookers. In this they seem to have been more fortunate than the pair described by Mr. Ingleby. I may add that no further instance of this kind has occurred since in the neighbourhood, and indeed had not done so for some time previously.—*Major Lawson.*

GLYCIPHAGUS PLUMIGER.—When I announced the capture of this acarus in the July number, I had only found one specimen; subsequent search, however, enabled me to find many more of both sexes. I scarcely thought this worth mentioning, but as my silence may have misled Mr. Lambert, it is perhaps as well to do so. For the purposes of observation, I endeavoured to breed them in confinement, and have been fairly successful. I have several thriving families at this moment. I may take this opportunity of stating that although, when I first announced the capture in England of the kindred species, *Glyciphagus palmifer*, I doubted its being truly indigenous, I believe now that it is, as I have since found it where its introduction on any foreign material would be highly improbable.—*A. D. Michael.*

DIVISION OF THE PTEROPODA.—At a recent meeting of the San Francisco Microscopical Society, Dr. G. Eisen stated that the class of Pteropoda had hitherto been divided in two orders, viz., Thecosomata and Gymnosomata, the animals belonging to the former being covered by a hard shell, those of the latter being perfectly naked. He thought a better characteristic would be the presence or absence of a silicate radula in the palate. The two genera exhibited were very likely new, but seemingly related to Tiedemannia and Pneumodermon. The wings of the former genus were drawn more minutely, and especially their anterior margin was seen in a highly magnified scale. The author had here found some new organs of sense, consisting of an agglomeration of larger cells situated on a pear-shaped body of minute granulated cells. In the middle of the larger cells was to be seen a small opaque, pearl-shaped body immediately connected with a nerve ganglion. Such peculiar organs were distributed over only a small surface of the hyaline wing. The masticatory organs of this genus were situated in the stomach, and consisted chiefly of four pyramidal chitinous teeth. The same organ of Pneumodermon was seen to consist of a radula full of silicate teeth. On both sides of this

radula, and also in front of the same, were large round, or triangular bodies, covered with chitinous teeth, between which the food apparently was ground before entering between the teeth of the more delicate radula. The animals of both genera being hermaphrodites, their male and female generative organs were found to be connected in the same individual. In both genera they seemed to resemble each other to some extent, but, as could be seen by the drawings, those of Pneumodermon were the most complicated, as having near to the exterior porus an additional large prostate gland.

BIRDS IN NORTH WALES.—It may be interesting to naturalists to know that several species of birds, which I believe to be uncommon, have been shot up the estuary of the river Mawddack, at Barmouth, during the winter, viz., shoveller (*A. clypeata*); golden eye (*A. clangula*); red breasted merganser (*Mergus serrator*), chough, &c. I should like to call the attention of your readers to a rather striking incident which came under my notice on Saturday, January 11, whilst walking past Aberamffra Harbour. Between twenty to thirty wrens (*Troglodytes Europæus*) flew from the rigging of the "Mary Jones" (a small schooner) to the branch of an oak-tree close by. There they remained for some time, until the approach of evening compelled them to seek shelter elsewhere. Will any of your readers kindly tell whether this is a common occurrence or not?—*Joseph J. Cotton, Barmouth.*

BOTANY.

THE CULTIVATION OF MISTLETOE.—As an old and successful grower of mistletoe, I would inform Mr. Bonar that its seeds vary, commonly contain two, and sometimes three embryos. It would have been found, long ago, that nothing is easier than to cultivate this plant, had not two erroneous statements been circulated in books, viz.: (1) that the *berry*, not the *seed* must be rubbed on the branch destined for its growth; and (2) that a *notch* is to be made in the bark to receive it. Take the seed out of the berry, and smear it on a smooth part of the bark, and it will adhere and grow. Where the radicle comes into contact with the bark, the latter swells. No further change occurs till the next year, when the tiny plants rise on end, open their cotyledons, and emit a minute shoot. They grow the length of one internode, annually; so that the age of a bough of mistletoe is readily known.—*Martin M. Bull, Jersey.*

SYMPHYTUM TUBEROSUM, NEAR EDINBURGH.—May I venture to point out a mistake into which Mr. King has fallen, when he says with regard to *S. tuberosum*, "a somewhat local plant in the neighbourhood of Edinburgh," a larger acquaintance with our flora will convince him that, instead of being "local," it is exceedingly common in the neighbourhood. It is very abundant on both banks of the Braid Burn, and also on the banks of the Water of Leith through many miles of its course. On the other hand, *S. officinale* is certainly "beal" in this part of Scotland, its place being filled up by *S. tuberosum.* I have not had so much field work in the south, as in the north, but, while in England I have been struck by the absence of what with us is a "common plant." For one station for "officinale" I can give twenty for "tuberosum."—*A. Craig-Christie.*

PLURALITY OF PETALS IN THE GENUS RANUNCULUS.—I have repeatedly found, not only *Ranunculus Ficaria*, as Mr. J. A. Weldon mentions it in the last number of SCIENCE-GOSSIP, but also *R. bulbosus* and *acris* with more petals than they should have, owing to a certain number of stamens having turned into that state. Several times have I looked in meadows, where *R. bulbosus* and *acris* grow abundantly, and found specimens with from five, six, seven and so on, up to twenty. This is generally the case when the ground is of good quality. I have also met *R. flammula reptans* and *sceleratus* with more than their usual number of petals, six or seven for instance. Once I met a specimen of *R. confusus* with six petals. —*T. Tempère, Manchester.*

GEOLOGY.

FOSSIL REPTILES RELATED TO MAMMALS.—There has lately been disclosed a large series of remains of American reptiles which appear to have been extremely abundant during the Permian age over the whole continent. This was one of the most remarkable faunas known in the history of the earth—distinct from what went before and what followed it. The structure of all the species is very complicated, but all agree in certain characters. The scapular arch, by the presence of an epicoracoid and certain other bones, forms a circle like the pelvis; and this gives significance to the name Pelicosauria, which Professor Cope proposed to give to the group. The specialised shape of the tarsus, the perforated vertebræ surmounted by tall knotted spines, and various other anatomical features have been dwelt upon at length by him. A series of skeletons of very similar structure have been discovered in the Permian beds of South Africa; but they differ from all American examples in their long sacrums, and in not having the vertebræ perforated. Owen had called these fossils therodonts, intending that the name should cover the American permian reptiles as well: but this Professor Cope considers impossible, since the American fossils are of a type distinct from the African. The two types together form an order of very high rank in the classification of vertebrates, which presents the nearest approach of any group of reptiles to the mammalia. Hence Professor Cope has designated them theromorphous. The presence

of the epicoracoid bone, the *os innominatum* and the form of the tarsus and humerus, all show the remarkable affinity of these reptiles to the Monotremata, and convinced Professor Cope that they ought to be considered the ancestors of the mammals. Yet there is no question but that they should be classed on the reptilian side of the dividing line.

PRESERVING BONES.—In answer to your correspondent, "W. G.," I beg to state that a very simple method of preserving post-tertiary bones, is to paint them with thin gum, which should be as clear and colourless as possible. This is an easy and inexpensive, and, as I know from experience, an effectual way of preserving them. It makes them very strong, and enables them to bear any reasonable amount of handling. The gum must be thin, or it will give the bones a shiny, varnished appearance. All fossils which are liable to crumble and fall to pieces, may be preserved in the same way.—*J. W. Carr, Cambridge.*

NEW CARNIVOROUS REPTILES.—Professor Owen has just identified the remains of a new and gigantic kind of carnivorous reptile among the collection of South African fossils collected by Mr. T. Bain. The name of *Titanosaurus ferox* has been given to this creature, which Professor Owen regards as of a more carnassial type than any existing carnivorous mammal.

THE GEOLOGY OF ARRAN.—At a meeting of the Glasgow Geological Society on January 16, James Thomson, F.G.S., read a paper on the "Geology of the North End of Arran." He first gave a description of the brecciated conglomerate of the Carriegills shore, and round Brodick Bay, extending eastwards to the shore below Masldon, pointing out that the views advanced by Sedgwick, Murchison, Ramsay, and Bryce, could, as regards these rocks, no longer be adhered to. He showed that the basement rocks of the carboniferous system rested upon the underlying breccias, and referred to sections exposed in Glencoly, Glensharg, and Cnocken Burn, &c., where the order of succession of these beds may be studied, and stated that beds of the same stratigraphical position could be examined in the following localities, viz.: Askoig, Bute; Millport, Cumbrae; the valley of the Griom; the Garple and Greenock waters, Muirkirk, Ayrshire; Logan Water, Lesmahagow; Lanarkshire; and Todholes, near Stirling, Stirlingshire. He then described the stratified rocks of the shore eastwards to Corrie, and referred to the limestone of that locality being charged with *Productus giganteus* and found with the ventral valve downwards, the reverse being the case in other localities for this fossil shell.

Mr. Thomson then reviewed the old red sandstone beds from Corrie to the Fallen Rocks, and described the nature of the fragments of rocks found in the breccias, near Corrie, which all were agreed was of undoubted upper old red sandstone age, and referred to the similarity of these beds to those found on the Corriegills shore. He referred to the desirability of further investigation of the Fallen Rocks before a satisfactory explanation of that extraordinary mass could be given. About fifty yards to the north of the Fallen Rocks he had some years ago discovered remains of fossil fish in great abundance in volcanic ash beds, and there also, in company with Sir Charles Lyell, discovered a tooth of Cladodus. The coast line was next traced to the section where Mr. E. A. Wimsch, F.G.S., made his discovery of fossil trees in the volcanic ash beds, and described in the Society's "Transactions." Proceeding northwards, a great fault is seen, produced by a broad igneous dyke, which can be traced up the hillside to the chasms seen in the breccias, on the top of the hill above the Cock of Arran. Mr. Thomson then referred to the physical features, and the fossil remains of the limestone found on the north-east shore, lists of which he had prepared to accompany his communication. Mr. Thomson then dwelt on the correlation of these marine deposits with the rocks of the same stratigraphical position throughout the central valley of Scotland. He also referred to the breccias at the Cock of Arran, and stated that they resembled those he had examined at St. Bees Head, Northumberland, and at Ballochmyle, on the banks of the Water of Ayr. Mr. Thomson then described his hunt throughout the range of rocks in the hills above the shore for fossil evidence of their age; and in these breccias he was at last rewarded by the discovery of no less than twenty-seven species of characteristic carboniferous fossils, a list of which he had prepared to accompany his paper. He was thus able definitely to confirm the conclusions of Sedgwick, Murchison, and Ramsay, as to the age of these rocks, at least to the extent that they are posterior to the carboniferous age; and at the same time to show clearly that the classification of these rocks adopted by Professor Geikie in his last published "Geological Map of Scotland" was erroneous, while the same may be said as to that of Professor von Lasaula in his work upon his studies and sketches of the Geology of Ireland and Scotland lately published.

NOTES AND QUERIES.

FERMENTATION.—Professor F. R. Eaton Lowe, in an article entitled "A Glass of Wine" in "Science for All," says, the operations connected with wine-making differ from those connected with beer-making in so far as it is necessary for the beer-maker to introduce a *ferment* into his *wort*, while the wine-maker has not to do this, because the grapes "contain sufficient nitrogenous matter in the shape of gluten, which speedily undergoes decomposition, and communicates its state of change to the associated sugar." It is certainly unnecessary for the wine-maker to introduce a *ferment;* but does fermentation take place in the way Professor Lowe says? I am under the impression that the wine-maker introduces his *ferment* unconsciously, just as sure as the beer-maker introduces his consciously. How does the Professor account for the presence in the liquid of the living

plant concerned in alcoholic fermentation? I thought M. Pasteur proved that the pure juice of the grape has no power to ferment of itself; and when he saw this he set to look for the cause of the fermentation, and found it in the small microscopic particles which stick to the outside of the berries, and even on the twigs of the vine. I shall feel greatly obliged to any of the readers of SCIENCE-GOSSIP who can tell me whether Professor Lowe or M. Pasteur is correct.—*D. M. D.*

ANEMONES IN AQUARIA.—Some of your readers may be interested in the following facts. I have a small bell glass aquarium which as a marine aquarium has been very successful, there having been no deaths for upwards of two years, and the anemones throughout have maintained a high standard of vitality, attributable, I consider, to regular feeding, aërations, and scrupulous cleanliness. Numerous young have been cast off and one stone is closely covered with what are apparently the larval form of the star fish. During this winter the anemones have been of an unusually errant disposition, and I have three times on different occasions observed what seem to be conjugations. In each case the first sign was the appearance round the base of the animal of spermatic cords, and these in some cases reach an inch and a half in length. They float in the water and that they are perceived by other anemones is proved by the animals moving up, and with their base partially covering the extended base of the first. They remain in this state for about twelve hours, the emission of the spermatic cords is increased till both are enveloped in the coils and these are perfectly visible, and between thirty and forty in number, at least I have counted as many. After some interval—about twenty-four hours from the first contact—the one that has moved up moves away, each closes and remains in a state of quiescence from which they do not emerge for some days, no matter how tempted by food or aëration. I shall be glad to learn if any of your readers have noticed similar occurrences.—*G. L. B., Denmark Hill.*

MISTLETOE ON THE PEAR.—A writer in SCIENCE-GOSSIP, page 43, 1877, asks for further evidence that the mistletoe grows on the pear. Kittel, in "Botanisches Taschenbuch" and Dr. F. M. Bechstein, in "Forstbotanik," page 679, both state that in Germany *Viscum album* is found on the pear. P.S.—Withering, in "British Plants," states that *Viscum album* occurs on the Pear.—*J. A. Sandford.*

MANDRAKE (?) (SCIENCE-GOSSIP, page 166, 1878).—Throughout the United States *Podophyllum peltatum* of the natural order Berberidaceæ is known as mandrake. The fruit, when fully ripe, is sweet and edible, and weighs from 1 to 4 oz.—*J. A. Sandford.*

HEMPSEED AND BULLFINCHES.—With reference to my letter on the effects of hempseed causing the plumage of bullfinches to become black, and which was inserted in SCIENCE-GOSSIP of November 1, it would appear that under the head of "Cage Birds," in a paper contributed to the "Times" of February 1, Norwich canaries fed on cayenne pepper (a teaspoonful to one egg) have their plumage under such diet changed into a bright metallic flush—which pales at every moult. I must confess that if I possessed any pet birds, whether bullfinches or canaries, I should pause ere I continued giving either hempseed or cayenne pepper on the ground of both being too stimulating for any lengthened period. It would be interesting to know what the opinion may be of extensive bird fanciers upon this subject.—*John Colebrooke.*

HYALOPHORA CECROPIA AT CLAPHAM.—In SCIENCE-GOSSIP, at page 46, Jas. Ives records the capture last July of a specimen of *Hyalophora Cecropia* at Clapham. He adds the rather extraordinary query, "Is it not likely to have escaped from some entomological cabinet?" Live insects are not usually placed in cabinets, nor do pinned and probably dead ones generally escape. The explanation, however, is very simple. Mr. A. Wailly, an importer and dealer in silk-producing bombyces of the Clapham Road, records in the "Entomologist," vol. xii. p. 9, that in December, 1877, he received from America an extraordinary number of live cocoons of this moth, and that a number of impregnated females which had emerged therefrom, he let loose in his garden. Some were also taken to a wood near London.—*W. L. Distant.*

CURIOUS SITES FOR BIRDS' NESTS.—From time to time, notices of birds' nests being found in strange and unlooked-for situations, have appeared in SCIENCE-GOSSIP. In the belief that a number of instances which have come under my own observation during my experience as a "birds'-nester," may not be uninteresting, I have been induced to write a short account of a few of the more remarkable deviations from the ordinary rules followed by most species of birds in their choice of a nesting-place, and which I have jotted down in my note-book whenever observed. Several years ago, I found a nest of the common thrush, on the ground, in a large clover-field, quite a hundred yards from the nearest fence. The nest was merely an apology for one, being but a few straws, collected together in a slight depression of the ground, without any attempt at lining, indeed I have seen plenty of lapwings' nests with far more materials collected about them. It was partially concealed by the young clover, which was about six inches high, but otherwise there was nothing to screen it from view. My attention was first drawn to the nest—which contained five eggs—by seeing the old bird fly off. I watched the nest closely, until the eggs were hatched, and the young ones nearly fledged; but one morning, I found that some prowling weasel or hedgehog had discovered and made a dainty breakfast of the unfortunate "throstles" as the mangled bodies of two, and the scattered feathers of the rest, plainly showed. This is the only instance I have noticed of a thrush nesting on the bare ground, away from any cover. Another thrush's nest was in an old milking-can which had been kicked about by the school lads, and finally lodged in a large thorn bush, about two yards from a much-frequented footpath, close by the village church. I chanced to throw a stone at the can when, greatly to my surprise, out flew a thrush. I lost little time in jumping over the fence, and found the nest snugly ensconced within the can, the mouth of which, being turned away from the path, prevented the nest from being seen by any of the numerous passers-by, and, as I only divulged the secret to a few trusted friends, I am pleased to say the mother bird safely reared her brood. I have found a nest of the blackbird on the branch of a tree quite thirty feet from the ground, and several nests of missel-thrush on the shelves of an old shed once used for the manufacture of drain pipes. I have also seen a nest of this species built on one of the stone walls used as fences in moorland districts. As in this case there were neither trees nor bushes within a considerable distance, I suppose the birds had been obliged to

adapt themselves to circumstances. Last year I found two robins' nests on the top of a large haystack, but they were destroyed by the stack being cut for sale. A pair of robins have, for several years, built their nest in the end of a pipe, formerly used to a stove in our schoolroom, flying in at either an open window, or a broken pane, and have generally succeeded in rearing their young. The partiality of the robin for curious nesting-places is well known, but it is surpassed in eccentricity by some members of the tit tribe, which seem to have a fancy for "camping" in the most unlikely and outlandish places; one hears of their nests being found in such places as the hat of an effigy, got up as a scarecrow; in a pump; in a flower pot; in a bottle; or in a box hung up against a wall, and I have myself found them in all these strange situations. One day, when crossing the orchard, I was rather startled at seeing a bird fly from between my legs, apparently out of the ground, and upon close search amongst the herbage, I found what seemed to be a mouse-hole. Procuring a spade I soon solved the mystery; a nest of the great tit, containing eight callow young, was built amidst the ruins of what had the year before been a wasp's nest, the inmates of which had, as I well remembered, given our household no slight trouble during the previous autumn. In the cavity formed by the wasps, and amongst the remains of their combs, the tomtit had found a snug nesting-place. I carefully covered up the hole, and believe the little bird brought up its family in peace. I have on two occasions found nests of the blue tit built amongst the honeycombs of a deserted beehive. Did space permit, I could cite many other instances of singularity shown by birds in their choice of nesting-places, but will conclude with the hope that what I have already narrated will not be totally devoid of interest to many, who, like myself, are fond of studying the manners and habits of our feathered friends.—*R. Standen, Goosnargh, Lancashire.*

BLACKBIRDS' NESTS AND THRUSHES' EGGS.—It may interest some of my fellow-readers of SCIENCE-GOSSIP to know that I have found a blackbird's nest with four thrushes' eggs and five blackbirds' in it; also a wren's nest in the roof of a thatched shed, inside, containing several eggs of the common wren as well as three eggs of the house sparrow; I have also several times found pheasants' and partridges' eggs in the same nest, but in none of these cases have I discovered which bird ultimately brought up the brood, as I regret to say in those days I used to take all the eggs I found.—*J. T. Green.*

THE CUCKOO'S EGGS.—In last month's number of SCIENCE-GOSSIP, Mr. James Ingleby states that the eggs of the cuckoo "vary very much in colour, and very much resemble the eggs of the birds in whose nests they are deposited." That this is only partially correct, despite the very high authorities by which it is backed, I am assured. I have in my collection no less than eleven specimens of these birds' eggs. Four of these were taken from the nests of hedge sparrows; all these four are of various shades of grey, mottled with darker spots, whilst those of the hedge-sparrow where of a bluish-green. One of the specimens I found in a wren's nest, along with nine wren's eggs. Here again the difference was very great, both as regards size and colour; the cuckoo's egg being brownish-grey, whilst the wren's were white and dotted with red spots near the larger end. Of the rest, two were taken from the nests of common wagtails; one situated in a pear-tree trained against a garden wall, and the other in a grape-vine in a similar situation. Two more were found in sedge-warblers' nests about three feet from the ground. One was taken from a white-throat's nest, and the last in May, 1878, from a tree pipit's nest built in a bank at the side of the high road. In these last cases the difference was of course, not so clearly defined, but all the cuckoos' eggs in my collection are some shade of grey. In fact I have never seen but one cuckoo's egg that was not, and this was of a decidedly brown tinge. Of course, when the cuckoo lays her egg in the nest of a skylark, tree pipit, wagtail, or whitethroat, the difference is not so very great from those of the other bird. In reply to Mr. Kerr's queries, he will see that I have taken a cuckoo's egg from the nest of the common wren, which was only about eighteen inches from the ground. With the exception of the tree pipit, I found all my cuckoo's eggs in nests placed several feet above the ground. In the edition of "White's Natural History of Selbourne," edited by Mr. Jesse, the editor states in a note, page 108, "It is now known, by examination of the ovarium, that the cuckoo lays several eggs." In conclusion, I would refer both gentlemen to Volume XII. of SCIENCE-GOSSIP, where the subject of the cuckoo and its habits is discussed.—*B. E. S.*

WOODPECKERS AND THEIR NESTS.—In the middle of February, 1878, I was deeply interested in a small woodpecker (*Picus minor*) which daily kept up its busy tapping on the dead boughs of some twenty poplar-trees at the end of my garden. I watched it whenever I could get close enough to see it clearly. At one time I saw a larger species fly from the top of the same tree that the smaller species was tapping on. On March 3, I observed that it had a mate with it. I watched the pair until the middle of April, when I lost sight of them until, on June 20, I saw one flying in a direct line towards the poplars, they being just within sight. I saw it a second time three days after in the same place just come from the direction of the poplars; it went over a wall; my appearance above the wall frightened it from some ivy growing on a house about ten yards distant, I believed at the time that it was searching for food, and had young up in the poplars; and on July 6 I was surprised to find that it had successfully reared its young in a hole that it had made in the under side of a dead arm of an apple-tree, only ten feet from the ground (when I had supposed it was fifty feet high in the poplars). The entrance was perfectly and smoothly made, very small, and arched over into the centre of the touchwood; the arm was only fifteen inches round; the hole was about fifteen inches deep, and recently made. The touchwood being quite clean, I carefully let a spoon down into the hole, but all was gone. On the 12th instant I paid a visit to the hole, and found it *newly* and *very much enlarged* in the same perfect manner, this could not have been done more than eight weeks, most probably had only been done a few days. A minute after this I heard the tapping up in the poplars, and searching, found my acquaintance of last year at his usual occupation; and watching it, saw it disturbed by passers-by and fly on to the apple-tree. My reason for inserting this interesting account is: can any of the readers of SCIENCE-GOSSIP inform me whether the larger species (*Picus major*) has enlarged the hole, and intends breeding in the apple-tree this season, or is it the same pair as last year? If so, why they should require a larger hole than last year, and at what date I may expect to find eggs (being a collector)? I should like to know more clearly what their tapping is for, I believe it is for two purposes.—*H. B., St. Ives.*

COLOUR OF BIRDS' EGGS.—I am afraid Mr. J. Ingleby will find it difficult to procure anything that

will answer his purpose. Varnish, of which I have tried many kinds, does not give a satisfactory result; and besides, destroys the natural appearance of the egg. I never use varnish now, but find that I can preserve the colours of nearly all eggs by taking care, when blowing them, not to allow any moisture to touch the outside of the shell; and when drying, before placing them in the cabinet, I carefully keep them *from the light*, for most eggs when newly blown, more especially those of a blue or greenish colour, and many of the hawk's fade more during a few days' exposure to the light, than they would in as many months when placed in the cabinet. Light should also be carefully excluded from the specimens in the collection. I have had few "faded" eggs since I adopted the above plan, six or seven years ago.—*R. Standen, Goosnargh, Preston.*

INTELLIGENCE IN MAN AND ANIMALS.—The settlement of the question raised by Mr. H. D. Barclay in the January number as to intelligence in men and animals, depends very much on what we consider to be the precise nature or manner of the reasoning process. As to this point there is a dispute amongst philosophers. One school holds that all deductive reasoning is from general propositions to particular ones, whereas J. S. Mill and his followers maintain that "all inference is from particulars to particulars," and on that account, "the lower animals profit by experience, and avoid what they have found to cause them pain in the same manner, though not always with the same skill, as a human creature. Not only the burnt child, but the burnt dog dreads the fire." As we have no evidence that animals can form general propositions, if we adopt the latter view, then it must be admitted that animals can reason as competently as man can. If, on the other hand, the former doctrine be adopted, then the seeming reasoning of the lower animals can be explained as a simple process of association. "Animals are led, not by a concatenated train of discovered relations, but by mere impulse, i.e., by the suggestion which comes up according to the law of co-existence." Mr. H. C. Rogers asks, "If an animal does precisely the same thing that a man would do under certain circumstances, are we not justified in concluding that animal and man are moved by the same power?" If "power" here means motive, then I do not think we should be justified in forming any such conclusion. Besides, it is impossible for us to know the full and precise "circumstances" under which any animal acts. Again, memory is an act of intellect, but certainly not an act of reasoning in the sense of inferring one proposition from another. As regards the affection of the dog, it is very probable that there is more of selfishness therein than is commonly supposed. That the dog likes his master for the latter's own sake can scarcely be supposed. The fact seems to be, that this animal is possessed of an irrepressible prodigality of life-energy, and any source of the gratification or exercise of that liveliness is of course exceedingly prized by him; and hence when the master dies, the fountain of this life and energy is stopped; "the very source of it is stopped," a circumstance amply sufficient to induce a serious revulsion of feeling, and an unwonted peculiarity of action. With regard to the wonderful feats performed by animals, Dr. Carpenter has, it seems to me, conclusively shown that these are merely mechanical, the result of the animal organism "growing to the way in which it has been habitually exercised." Finally, the view that the reason of man is only developed instinct, has been seriously disputed by men of the highest culture, ability, and sanity. Man seems to have the faculty of forming certain notions (such as moral good, the fair, the sublime, God, &c.), and a power of anticipating the future, &c., which it would be difficult to prove were ever acquired, or could possibly be acquired by a mere process of development. The average cranial capacity of anthropoid apes and of man, savage or civilized (viz. 10 to 26 or 32), exhibits a proportion which is altogether inexplicable on the supposition that man's brain is a lineal descendant of that of some pre-historic ape, monkey, or baboon.—*P. Q. Keegan, LL.D.*

INTELLIGENCE IN ANIMALS.—Your correspondent, Mr. A. C. Rogers, quotes my words correctly, viz.:—"The great difficulty in the investigation of the minds of animals appears to be that man instinctively and unconsciously, unless checked by reflection, explains their actions, especially in extraordinary cases, by his own modes and laws of thought," but when he asks "will Mr. Barclay kindly inform us how else we are to explain their actions if we are not to use our own modes and laws of thought," he appears to have misunderstood my meaning. Certainly we must use our own laws of thought; most of us do not use them sufficiently. I will illustrate my meaning by considering the questions he puts. Is it simply instinct that induces a dog to starve itself to death on the grave of its master? or risk its life unbidden to save that of a helpless child? In my last letter I defined reason as the power to draw a conclusion from premises. Now, touching as the death of a dog on the grave of its master is, I can see in it no act of reason, but should rather conclude it indicated the absence of the faculty, neither can I perceive any act of reason in a dog leaping into the water unbidden to save a child, which he may do precisely in the same manner as he would jump after a stick which I have also seen a dog do unbidden. A man who could swim and declined to rescue a child from the water would be justly blamed, but who could blame a dog if it remained barking on the bank? It is beyond dispute that animals have some intelligence and memory, but what I question is their power of reasoning, which is the root of man's civilisation and makes him a responsible being. It is a distinct faculty, and unless animals were originally endowed with it, that it should be developed by training as some maintain, appears to me simply incredible, and I have never yet read an anecdote that convinced me they are possessed of it. Since writing my first letter I have seen a book, "Thirty Years among Wild Beasts in India;" the author's remark on the intelligence of elephant and the popular opinions thereon confirm my view of the question.—*H. D. Barclay.*

A CURIOUS CRUSTACEAN.—Some years ago I was passing by a large stagnant pool, when my attention was arrested by a curious creature just beneath the surface of the water, which after some trouble I succeeded in capturing. As I have never read of any fresh-water inhabitant resembling it, I thought some of your correspondents might be able to inform me what it was. As nearly as I can recollect, it closely resembled the common green crab of the seashore, excepting that its "legs" were longer and thinner, and the carapace was circular and serrated at the edges. I brought it home in safety, but whilst I went for the necessary appliances for the examination, it mysteriously disappeared. Subsequently I discovered another and smaller one, which was also lost by an accident before I could study it. The locality whese these crustaceans (?) were found, was in the middle of Berkshire, in a large pond close to a wood. The month was July. The creatures were

both apparently basking in the sun at the surface of the water; neither made any effort to escape. They appeared to have no power of swimming nor diving. I hope some of your correspondents may be able to inform me what they were.—*Junior.*

HYDROPHILUS PICEUS.—Can any of the readers of SCIENCE-GOSSIP inform me whether the above-mentioned insect can be reared in captivity; if it can, is there any locality near London where I can look for the beetle or eggs with any chance of success; or can I buy a supply of the eggs of any aquarium dealer? The Rev. J. G. Wood, in his "Fresh and Salt Water Aquarium," gives some information about this beetle, but he neither mentions the time of year when the egg is to be found, nor the food of the larva. On Plate x. he depicts two specimens, one twice the size of the other; are these the different sexes, or extreme variations of size?—*F. Crosbie, Barnet.*

THE DOUBLEDAY COLLECTION.—I was very pleased to see the note in your last number from Mr. James English stating that the above collection is in such good condition, it would however have been of far greater use if published earlier. When Mr. Farn's letter appeared in the "Entomologist," I waited for a month to see if any one would contradict it, but as no one seemed to trouble about it I took the matter up myself—my letter was published in the "Entomologists' Monthly Magazine" for December, and drew from Mr. Farn (the gentleman who had alleged the collection to be in such bad condition) a reply evidently intended to cast ridicule upon myself. I again wrote to the editors of the "Entomologists' Monthly Magazine" with a reply to Mr. Farn, fully refuting all his accusations and remarks, but had my letter returned, with a note from the editors to the effect that as they were then satisfied that the collection was in good condition the correspondence would be stopped. I certainly thought that a short note from the editors to that effect would have appeared in the next number, but this was not done, thus entomologists are left to believe that I am totally disconcerted by Mr. Farn's letter, which is by no means the case. I think under these circumstances I am fully justified in making these remarks to correct so great a misconception with regard to myself. Mr. English's note in last month's SCIENCE-GOSSIP settles the matter in a most satisfactory manner.—*W. J. Vandenbergh, Jun., Hornsey, Middlesex.*

GLYCIPHAGUS PLUMIGER.—In the July number of SCIENCE-GOSSIP, Mr. A. D. Michael announced the capture of a single specimen of this acarus, and after remarking on one in the possession of Mr. George, of Kirton Lindsay, says, "We may, I think, fairly claim this as a British species, although only a single individual has been detected in each instance." I have been fortunate in capturing a large number, male and female, of this interesting mite: and as in the former case, they were found among the fodder in a stable in this city. As there is a considerable quantity of foreign hay used in this place, it is quite probable it may have been introduced; but the fact of its being alive and active, in the middle of December, during a very severe frost, shows that it is hardy enough for our northern climate.—*J. Lambert, Edinburgh.*

YEWS IN CHURCHYARDS.—In reply to E. Straker's desire to obtain information respecting the various traditions relative to the planting of the yew in churchyards, &c., the following extracts may not be uninteresting to him, or other readers of "SCIENCE-GOSSIP;" they have been carefully searched out by a friend living in North Wales, and are well authenticated. The yew (*Taxus baccata*), so celebrated in our own country for its churchyard associations, and for its being employed in the manufacture of bows, the weapon principally used by our warrior ancestors before the introduction of fire-arms, has fewer legends connected with it than might be supposed. The custom of planting yew-trees in churchyards has never been satisfactorily explained. Some have supposed that these trees were placed near the churches, for the purpose of affording branches on Palm Sunday; others, that they might be safe there from cattle, on account of their value for making bows; others, that they were emblematical of silence and death; some, that they were useful for the purpose of affording shade or shelter to those places of worship when in their primitive form. Different writers have entered more philosophically into this question, and presume that the yew was one of those evergreens which, from its shade and shelter, was especially cultivated by the Druids in their sacred groves, and around their sacrificial circles; that when Christianity superseded Druidism, the same places were chosen as the sites of the new worship, and that in this arose the association of the yew-tree with our churches and churchyards. It was also employed in funerals, ("by shroud of white, stuck all with yew;") in some parts of England dead bodies were rubbed over with an infusion of its leaves, to preserve them from putrefaction; and many of our poets allude to its connection with ideas of death. According to Pennant's Scotland, vol. iii., page 25, 4th edition, the yew, by our ancestors, for a classical reason, seems to have been planted among the repositories of the dead; and they had also a political one, for placing them about their houses: in the first instance they were the substitutes of the *Incisa Cupressus;* in the other, they were the designed provision of materials for the sturdy bows of our warlike ancestors. Nature, who speaks to our eye as well as to our ear, paints the yew with gloom; and we see at a glance, the propriety of planting it in churchyards, with respect to poetic sentiments, as well as to its former warlike utility. Tennyson imagines man's last foe, death, as "walking all alone beneath a yew." The "In Memoriam" of Tennyson describes the yew at the "lychgate:"

> "Old yew, which graspest at the stones
> That name the under-lying dead,
> Thy fibres net the dreamless head,
> Thy roots are wrapt about the bones," &c.

Various other poetical allusions might be mentioned, from Wordsworth and others, in reference to these dismal trees, which are very beautiful, but perhaps others may contribute further remarks on the interesting subject of the yew-tree.—*E. Edwards.*

YEW-TREES IN CHURCHYARDS.—As to the reason why yew-trees are so often found in churchyards. I was walking with a clergyman three or four years ago in a churchyard in Kent, and he pointed out to me the four yew-trees which grew, one at each corner of the sacred inclosure. He told me that the reason why these trees are so often found in old churchyards is that there used to be a law that every parish was to grow yew to be made into bows for the use of the parishioners. As the foliage is very injurious to cattle (cows which have eaten of it frequently die) the yew-trees were planted in the churchyards, in order that there might be no danger of the cattle having access to it. —*C.*

TASMANIAN LAND SHELLS.—Mr. Pettes, in an article on "Sea Goings," gives me credit for having

published a catalogue of Tasmanian Land Shells containing a list of all discovered up to date of publication, 1871. He, however, omits to say that this catalogue, as he terms it, contains over forty descriptions of species nowhere else to be found. In my humble opinion this is something more than a catalogue. I regret that the book has been long out of print, so am unable to send you a copy. Mr. P. is in error when he states that *H. vitrinaformis* was described from a specimen found by him on Mount Wellington. That shell came from a place forty or fifty miles further south, and the type shell is in my possession. It was found by a Mr. Longley.—*W. Legrand.*

THE BIRDS AND THE WEATHER.—We have been diligently feeding the poor little birds here as usual, as in duty bound, during this most trying winter, and a very constant and amusing *clientèle* we have had, furnishing us with a few incidents which may interest your readers. Amongst other provisions for them, we have been in the habit of tying up lumps of fat on a neighbouring bough. At first the tom-tits were left in sole and undisputed possession of this appetising morsel. The robins, however, soon began to cast a longing eye upon it; and, for some time, could not succeed in reaching it, save by a rapid series of hops and flying bites, which must have been very tedious, and anything but satisfying. At last, by astounding perseverance, they mastered the difficulty, and became almost as expert as the tits themselves in perching upon or near their prey and making a meal from it. We did not observe any other birds that arrived so completely at this result; though certain blackbirds and sparrows made many attempts in that direction. On one occasion the lump of fat was disengaged and fell to the ground, but an astute tit managed to restore it to its place, and to impale it upon a thorn, by way of larder. The visitors to our banquet were not altogether confined to bipeds. For a few days a wretched, scrubby-looking half-starved rat made his appearance on the scene, from which we had not the heart to banish him. Blackbirds, thrushes, house and hedge-sparrows, chaffinches, tits in abundance, robins, etc.; one starling and one wagtail were our ordinary company.—*C. W. Bingham, Bingham's Melcombe.*

THE WATER SHREW A DESTROYER OF THE SPAWN OF FISH.—It may not be generally known that the water shrew is a great enemy to the preservers of fish. My cousin, Mr. Masefield, of Ellerton Hall, Salop, annually rears a large number of trout by artificial hatching. For some time it was observed that depredations were committed by some unknown visitor on the troughs containing the spawn; traps were set, and while I was visiting my cousin the culprit was discovered by the capture of *Sorex fodiens.* If this fact has not been observed before, it adds one more to the numerous obstacles which the spawn of fish has to contend against in arriving at maturity in its natural state.—*W. B. Masefield, Tittenson Parsonage, Stoke-upon-Trent.*

HOLES IN OOLITIC ROCKS.—The explanation given by your correspondent H. P. M., in SCIENCE-GOSSIP for January, to F. N. D.'s question, asked in SCIENCE-GOSSIP for November, 1878, "Why holes are found in oolite beneath sand," I think cannot be the correct one, because "water percolating through a superstructure of sand" could not, from the superincumbent mass, move these sand particles about, and if there is no motion there can be no friction, consequently no wearing away. May not these holes have been made by the Lithodomi, or boring mollusca, previous to, or about the time of, the upheaval of, (or receding of the sea from) the formation in which these holes are found? for it is well known these delicate little creatures have the power of perforating this and similar kinds of rocks.—*J. W., Rotherham.*

FOLK LORE.—Have we a saying in England, similar to the one frequently made use of in Rome, viz.: "St. Catherine's (November 25) weather is Christmas weather." There the peasants look for the same weather on Christmas Day as on November 25. —*C. F.*

INTERESTING PLANTS IN THE ROYAL GARDENS, KEW.—On the shelf devoted to Asiatic plants in the Palm House we notice *Carica papaya*, the Papaw, introduced into this country from India in 1690. Linnæus supposed it to be a native of Caria, but although now cultivated generally through the tropics, it is considered as originally a native of South America. It has been lately assigned to the natural order Passifloreæ, tribe Papayaceæ. A diœcious tree with a soft unbranched stem about twenty feet high, slightly swollen at the base, the palmatifid leaves with long petioles being clustered at the summit. The fruit, when ripe, is yellow, and somewhat resembles a melon, it contains an acrid, milky juice, in which Vauquelin found by analysis the albuminoid fibrine, a substance until then believed to be peculiar to the animal kingdom. The whole plant has the remarkable quality of rendering fresh or tough meat tender, by causing a separation of the muscular fibres, and the same effect is said to be produced by merely suspending it among the leaves. At the corner of the central path we find *Strychnos potatorum*, the "clearing nut," which abounds in the forests of India. Natural order Loganiaceæ. It forms a small tree bearing opposite ovate leaves, with two interaxillary spines. The hard wood is applied to a variety of domestic uses. The fruit is black, about the size of a cherry, and contains one seed. The natives of India employ the dried seeds to clarify muddy or impure water, and as they will never drink spring water if they can obtain any from ponds or rivers, the "clearing nut" must be simply invaluable. The inside of the vessel is rubbed round with a seed, for a short time, the water to be cleared is poured in and all its impurities quickly sink to the bottom. Dr. Pereira states that this result is due to the fining action of the albumen and casein, and that many other seeds might be used for the same purpose. On the African shelf is *Tanghinia veneniflua*, the tanghin or ordeal-tree. This is an apocynaceous tree, with alternate elliptical leaves, and long terminal cymes of pale pink flowers. There is a double ovary, but only one usually comes to perfection, forming an ellipsoid fruit about the size of a plum containing a hard stone which incloses the seed. It is this seed which once had so great a reputation among the natives of Madagascar as a detector of guilt; but whatever doubt we might feel concerning its efficacy in that respect, it certainly possesses such extremely virulent qualities that it has been described as "the most poisonous of plants." A kernel no larger than an almond would be, if equally divided, sufficient to destroy twenty persons in less than half an hour. In the year 1830 the Queen of Madagascar determined to rid the country of sorcerers and decided upon a trial by ordeal as the most effectual means of doing so. Great numbers of persons were tried, and it is recorded that while the "unknown plebeians" succumbed to its deadly influence all the "nobility" recovered. Happily such trials are now things of the past. A short distance from the last plant on the

same side is another ordeal-tree, not quite so well known, but included in the same order, *Texicaphlœa Thunbergi* a native of South Africa. Its leaves are opposite, elliptical, and of a very dark green colour; it is now showing an abundance of small white flowers in axillary clusters. A decoction of the bark is used by the Hottentots as an ordeal.—*Lewis Castle, West Kensington Park.*

METROPOLITAN ASSOCIATION.—At the monthly meeting held on January 28, the following papers were read—"On the Dissection of the Cockroach," by T. J. Briant. The main object of this paper was to show the proper method to be adopted in microscopic dissection, more especially by those who could not afford time for technical investigations.—"On Micro-photography," by C. W. Stidstone. Examples of the author's work were shown upon the screen, some of them being very creditable.—"The Cuticles of Flowers," by Sidney Ireland.—"On Reproduction in the Lesser Celandine," by Henry T. Vivian. The author remarked that in the spring of last year he brought for examination from the neighbourhood of Isleworth a few flowers of this plant; they were placed in water exposed to the light, and he was enabled to observe the very interesting mode in which the young plants of this species were produced. The flowers, to the stalks of which one or two leaves were attached, soon decayed, but singularly enough there were produced what appeared white grains at the axils of the leaves which increased in size as the plant decayed and then fell off and remained at the bottom of the jar. At the end of the year they appeared to be budding and at present had become the tuberous roots of young plants, such as were then exhibited on the table. This circumstance did not appear to be noticed in the botanical works to which the author had access, but he found the process described in a book just published by Shirley Hibbert. It appeared this plant never produced seeds in this climate, though perfectly fitted to do so, as all the organs of fructification were complete. The fact of the plant flowering in the wet weather might perhaps account for the non-production of seed, but it was interesting to note that another form of reproduction took place when it could not be accomplished in the usual mode.—"On the Horse-Bot," by J. W. Goodinge, F.R.M.S. This paper was simply a general introduction to the noble series of slides which were exhibited under several microscopes.

BOUGAINVILLEA *v.* BUGAINVILLEA.—The apparent inconsistency in the orthography of the above word, observed by Mr. John Gibbs, admits of an easy explanation. The latter was adopted by Lindley as the best Latin rendering of the French name. The long *ū* nearly represents the sound of the French diphthong *ou*, pronounced *oo*, which does not occur in the Latin language. As regards the first and generally accepted orthography, we find in "Laws of Nomenclature," by M. Alphonse de Candolle, received by the International Botanical Congress, 1867, as "the best guide for nomenclature in the vegetable kingdom," that article 27 states, "when the name of a genus and sub-genus or section is taken from the *name of a person* the spelling of the syllables is preserved without alteration even with *letters or diphthongs* now employed in certain languages, but not in Latin." Mr. Gibbs will find some excellent remarks on this subject in SCIENCE-GOSSIP, 1877, page 193.—*L. Castle.*

CURIOUS EFFECT WITH THE MICROPHONE.—I do not know whether any one has observed the following curious effect with the microphone. Placing the receiving telephone on the stand of the microphone, so that the vibrating disk is near the carbon pencil, I find that a slight touch on the microphone produces a continuous musical note, which sounds on till stopped by a rougher touch, or by tapping the table. I used an upright carbon microphone.—*F. R.*

LABURNUM.—In this town there is a laburnum which flowers regularly twice a year, at the usual time and again in the autumn; the flower pendants are shorter, and the flowers closer together than in the ordinary laburnum, a specimen of which grows in the same garden. Would B. H. Nesbit Browne state whether the same peculiarity exists or not in the specimen he has seen?—*W. G. Tuxford.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

R. BEER.—The stories of vipers swallowing their young, are to be found in every work on natural history. In years past, our Notes and Queries columns have chronicled many such.

J. W. T.—Your papers will certainly appear on the first opportunity. We should be glad to accept that you now refer to.

K. E. GAMP.—"Blue John" is a fluate of lime, not manganese. Oxide of manganese is the violet colouring matter of it. The mineral is very soft, and can be easily polished after cutting and rubbing down. The method of polishing fossil wood depends on how the latter is mineralised. If silicified, it is first cut and ground down, and then polished with emery, the finest kind being used last.

C. R. S.—We cannot tell you how to get an assistant-curatorship in a colonial or other museum, except by advertising for such a situation.

B. C. J. (Leeds).—See the Rev. J. C. Crombie's article on lichens, in "Collecting and Preserving Natural History Objects," price 3*s.* 6*d.* Hardwicke & Bogue, 192 Piccadilly, London, W.

R. RATCLIFFE.—The brown objects found underneath the beetle are the beetle-mite (*Gamasus coleoptratorum*).

MICRO.—The anchor-shaped spicules mounted on slides are undoubtedly those of sponges. The coloured spicules appear to belong to some Alcyonidium. Please send us one or two other slides when you mount them, that we may investigate them further.

J. A. SANFORD (Toledo, Ohio, U.S.)—Wishes botanists who are desirous of exchanging rare British for American plants, to communicate with him as per above address.

H. J. LIVETT.—The grubs which attacked your celery were evidently the larvæ of some beetle, but they reached us in such a dried-up and shrivelled condition, that it was quite impossible to make out the species. Watering growing celery with chamber lye is a capital stimulant to the plant, and an equally bad one for grubs of all kinds.

W. E. M.—The article on "Collecting and Preserving" is the best one we know of on the subject of cleaning and preparing bones. There is a great dearth of information on the subject, and we should be glad if some of our readers who have worked at it would contribute a good practical paper on the subject.

J. C. RAVE.—The articles on "Our Common British Fossils, and where to find them," will be resumed in our May number, and continued. Press of literary work has delayed their issue.

DR. M.—The objects on the piece of sea-weed were a colony of polyzoa, called *Membranipora membranacea.*

C. W. L.—The New Cross Microscopical and Natural History Society, meets at the New Public Hall, Lewisham High Road.

R. HUMPHREY.—Our correspondence is too extensive to permit us acknowledging by letter the receipt and acceptance of every MS. sent. If accepted, we insert it in the order of its date, as far as we possibly can. No apology is needed on your part.

J. E. M.—Wishes to know if "Heywood's Register of Facts and Occurrences relating to Literature, Science and Art" is still in existence. Perhaps some of our correspondents can answer him.

H. SISSONS.—We are obliged, in the general interests of other

"exchangers," whose advertisements are crushed out, not to allow an "exchange" to exceed three lines, unless it is paid for as an advertisement. Yours would make eight lines.

B.—A good specimen of Euplectella might be purchased at any natural history dealer's in London, say Henson's in the Strand; T. D. Russell, or Bryce Wright, for about 7*s.* 6*d.* or 10*s.* (2) As to preserving crustaceans, see note on this subject by a capital authority, Mr. T. D. Russell, in September number of SCIENCE-GOSSIP for 1877. (3) There is no book or even exhaustive article on the latter subject. One is much needed.

GREGORIUS.—The occurrence of starlings in flocks, especially in the southern counties, is very common during hard winters. Many of them leave the northern parts of Britain. The starling has a sweet, twittering kind of note, but we should hardly rank it among our song-birds.

W. BENNET.—Bat received. Will examine it and let you know.

J. E. STEPHENS.—The object is part of the cluster of eggs laid by the common whelk *(Buccinum undatum)*. See "Half Hours by the Sea-side," by J. E. Taylor (page 203), published by Hardwicke & Bogue, price 4*s.*

H. G. WHEELER.—We believe the diatom you found in the mussel is undescribed. It is a Cocconeis, and might be called *Cocconeis umbonata*, or *Cocconeis crucifera*.—K.

EXCHANGES.

WANTED to exchange lichens for some desiderata in Parmeliæ, Ramalinæ, Stictæ, &c.—J. McAndrew, New Galloway, N.B.

RISSOA LACTEA, *Homalogyra rota*, and other rare British shells, offered for minerals. Lists exchanged.—E. Duprey, Jersey.

WANTED, in exchange for good typical specimens of Cornish rocks, and some minerals, a good collection of fossils representing the new red sandstone, or the permian or the old red formations.—S. Tressider, Jun., Marlborough Road, Falmouth.

I HAVE a quantity of shells, mostly small, from east and west coasts of Africa, which I should be glad to exchange for micro slides or good material.—G. W. Brady, Carrow Works, Norwich.

DUPLICATES of forty species of British marine shells for others or birds' eggs.—Thomas H. Hedworth, Dunston, Gateshead.

WANTED, named algæ, zoophytes, &c., exchange.—3 Belmont Villas, New Brompton, Kent.

FOR a fine spray of *Plumularia falcata* or *Sertularia abietina*, each loaded with *Crisa eburnea*, and *Cellepora pumicosa*, send well-mounted slides to E. W. Burgess, 35 Langham Street, London. Pollens and rock sections preferred.

WANTED, tooth of labyrinthodon, for microscopical purposes; will give interesting slide or material in exchange. W. H. Harris, 44 Partridge Road, Cardiff.

WANTED, a copy of the last edition of the "Micrographic Dictionary"; anyone having one for disposal, at a reasonable price, will oblige by addressing H. G. Wheeler, 24 Knowsley Street, Bury.

GOOD British shells given in exchange for the shell stoppers of foreign shells (Operculums) of various sorts. Also slabs of polish of madrepores for good Silurian fossils. Will also exchange thin down specimens of corals for the microscope for good foreign Pinnæ, Mediterranean sorts preferred.—A. J. R. Sclater, 4 Bank Street, Teignmouth, Devon.

"CONCHOLOGY," by W. Wood, vol. i., 59 hand-coloured plates, in good condition. Wanted, Nicholson's "Palæontology," or offers.—J. Carpenter, Cheshunt, Herts.

WANTED, a few amateurs to join an ever-circulator, devoted to botany, which has been in circulation since 1877. For further particulars, address "Conductor," 233 Upper Brook Street, Chorlton-on-Medlock, Manchester.

WANTED, "L. C." 7th edition, Nos. 5, 13b, 18c and d, 23, 25, 32, 37, 65, 90, 103, 106, 148, 153 (?), 214, 215, 221, 309, 367b, 395, for others. Send lists. Also 100 named mosses, offered for same number from another locality, or for an equivalent.—R. V. Tellam, Bore Street, Bodmin.

"L. C.," 7th edition, Nos. 41, 45, 107, 124, 172, 209, 366, 667, 814, 822, 824, 831, 858, 875, 906, 932, 1040, 1135, 1264, 1271, 1401, 1447. Send lists to H. R. Moiser, F.G.S., 2 South View, Haworth, near York.

WANTED, objects of marine zoology. Agates, minerals, &c. offered in exchange.—J. P. Wright, Sunnybank Terrace, Undercliffe Lane, Bradford, Yorkshire.

WANTED, a good second-hand microscope; write, stating full particulars, to C. McIntosh, 110 Dalling Road, Hammersmith, W.

WELL-MOUNTED slides of portions of pigeon post, used during siege of Paris, in exchange for two slides of interest, also well-mounted.—L. Hawkins, Hillside, Hastings.

THREE skulls, lemur, porcupine, and another, also a good scorpion, and a small flying-fish, to exchange for British birds' eggs, side-blown, named fossils, or offers in natural history objects. SCIENCE-GOSSIP for 1877, wanted, unbound preferred.—W. B. R., 165 White Ladies Road, Bristol.

AUTHENTICATED, side-blown eggs, 300 species, including European, British, and African, clutches, broad-billed sandpipers, parrot crossbills, hawk, owl, red-foot falcons, and most of the birds of prey, collected 1878; exchange arranged by letter.—Sissons, Sharrow, Sheffield.

WANTED, living specimens of Doris, Trochus, Nassa, &c. in exchange for good micro slides, all well-mounted.—Apply Henry Insley, 1 Back of Chester Place, Gerrard Street, Birmingham.

To exchange, sixteen three-shilling parts of "British Wild Flowers," by J. E. Sowerby, for Cox's "British Coleoptera" and natural history specimens; also, British plants for fossils.—G. Robson, 92 Cranbourne Street, Leicester.

DUPLICATES, pairs of fine well-set local Lepidoptera from cabinet. Desiderata, skins of birds, squirrels, &c.

"NATURE" for 1876 (four numbers missing), offered for foreign or British Algæ.—E. C. J., Monson Nursery, Red Hill, Surrey.

ONE HUNDRED silkworms' eggs (*Bombyx Yama Mori*), on receipt of stamped envelope or object of interest.—Mrs. Skilton, London Road, Brentford, Middlesex.

CASSELL'S "Wild Flowers," 24 numbers; "European Butterflies and Moths," 12 numbers; a West Indian centipede and two lizards in spirits. Will exchange all or any of these for "Popular Science Review," geological works, or fossils.—J. A. Floyd, Mission House, Alcester, Warwickshire.

SLIDE of *Glyciphagus plumiger*, in exchange for other acarus (rare) or animal parasite.—J. Lambert, 12 Glen Street, Edinburgh.

FORAMINIFEROUS SAND from Barmouth, very rich, containing many rare forms, in exchange for slides, material, or shells.—J. J. Colton, Barmouth.

DUPLICATES of British land and fresh-water shells offered, and the localities of each recorded. *Succinea oblonga, Lim. Burnetti, Lim. involuta, V. pusilla, T. antivertigo, V. substriata, V. alpestris, V. minutissima, V. angustior, Pupa ringens.* Desiderata, named foreign land and marine shells, which, if not in stock of any collector, are readily obtainable from dealers.—W. Sutton, High Claremont, Newcastle-on-Tyne.

WANTED, to borrow for a short time a flora of South Devon. Address, with terms, A. D. Melvin, North Malvern.

FOR well-mounted flea from mole, hedgehog, rabbit or hare, also cattle tick, send good slides, marine diatoms, diatomaceous earth, or good micro-fungi particularly wanted.—George Turvill, East Worldham, Alton, Hants.

WELL-ROOTED plants of exotic ferns, blooming, greenhouse plants (not bedding) and many species of the Cacti tribe, several producing magnificent flowers, in exchange for rare British shells, foreign shells, polished stones, books on natural history, or offers.—E. R. F., 82 Abbey Street, Faversham.

CRYSTALS of Zeolite from the Giant's Causeway, good polariscopic object; also Foraminifera from Antrim and Down beach floatings, and diatomaceous earth from Toome bridge, for any good slides. Lists exchanged.—William Gray, Mount Charles, Belfast.

BOOKS, ETC. RECEIVED.

"Notes by a Naturalist on the 'Challenger.'" By H. N. Moseley, F.R.S. London: Macmillan & Co.

"The Study of Rocks." By F. Rutley, F.G.S. London: Longman & Co.

"Practical Geology." By W. J. Harrison, F.G.S. London: W. Stewart & Co.

"Geological and Geographical Survey of Colorado, &c.," 1878. Washington: Government Printing Office.

"Birds of the Colorado Valley." By Dr. Coues: Washington: Government Printing Office.

"Journal of the Royal Microscopical Society." February.

"American Quarterly Microscopical Journal." January.

"Journal de Micrographie." January.

"Feuilles des Jeunes Naturalistes." February.

"Les Mondes." February.

"Revue Mycologique." January.

"Midland Naturalist." February.

"Land and Water." February.

"Brierley's Journal." February.

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 12TH ULT. FROM:—F. K.—T. S.—C. P. O.—J. McG.—E. D.—W. B.—W. H. D.—J. C. W.—S. T.—T. P.—F. T. F.—T. W.—W. L. B.—H. B.—E. E.—G. W. B.—W. E. M.—C. W. B.—A. J. R. S.—W. L. G.—F. M.—C. R. S.—H. G. W.—J. C.—H. D. B.—W. L. D.—E. W. B.—I. C. T.—Dr. M.—T. H. H.—J. A. S. D. M. D.—G. L. B.—H. P. M.—H. W. L.—W. H. H.—R. R.—J. O. Dr. P. Q. K.—M. M. B.—J. E. M.—R. S.—G. R.—R. E.—J. W. S.—J. C. R.—H. I.—J. S.—W. J. H.—A. B.—F. C.—W. B. R.—J. S.—E. M.—Dr. De C.—R. H.—A. D. M.—C. McI.—J. P. W.—J. W. C.—R. V. T.—R. B.—T. F. U.—A. C. C.—W. J. V.—H. R. M.—F. I. W.—L. C.—J. T.—G. N.—J. R.—V. W. M.—B. E. S.—C. F.—W. B. M.—J. U.—W. S.—J. J. C.—J. W. T.—H. E. G.—J. L.—J. A. F.—H. S.—Professor T.—J. F. T. D.—S. C. H.—W. W.—G. R. G.—M. S.—E. C. J.—W. H. H.—W. S.—E. R. F.—G. T.—R. P. P.—C. R. L.—A. D. M.—W. B.—G. C. D.—W. G.—W. E. B.—J. E. S.—&c.

A GOSSIP ABOUT NEW BOOKS.

WE have not been so much delighted with a book since we read Darwin's "Journal of a Naturalist," as we have with Mr. H. N. Moseley's *Notes by a Naturalist on the "Challenger."* (London: Macmillan & Co.) Singularly enough, the book is dedicated to Darwin, in acknowledgement of that authors' "Journal." We cannot forbear quoting the "Dedication," for although these literary vagaries are "survivals" of a period, when they were unfortunately necessary to a poor author, yet they afford modern writers the opportunity of expressing their genuine gratitude for services other than pecuniary they have received. Mr. Moseley's dedication is moreover representative, for it expresses the feelings of many grateful naturalists who have not the opportunity of so practically acknowledging it as Mr. Moseley has. "To Charles Darwin, Esq., LL.D., F.R.S., &c. From the study of whose 'Journal of Researches,' I mainly derived my desire to travel round the world; to the development of whose theory I owe the principal pleasures and interests of my life, and who has personally given me much kindly encouragement in the prosecution of my studies, this book is, by permission, gratefully dedicated."

Mr. Moseley has long been regarded as one of our most promising young naturalists. He inherits the scientific tendencies of his father, the distinguished and lately deceased Rev. Canon Moseley. As a Fellow of Exeter College, and the possessor of the Radcliffe travelling fellowship, he has been fortunately enabled to pursue studies for which he is so well fitted. His researches in the natural history relations of the Milleporidæ and Stylasteridæ, in which he has shown that these abundant and so-called "Corals" are in reality allied to the *Hydroid polypes*, rather than to the Anthozoa, have opened out a new field of speculation and classification. Although the "Challenger" expedition has already furnished us with abundant literature, it is not invidious, but simply a justice to the talented author of this book to say that none will be so warmly or satisfactorily welcomed and read. In a pleasant confidential manner, Mr. Moseley makes his readers the companions of his voyage. We gradually feel as he does the necessity to examine every object, mineral, vegetable, or animal, and we are delighted by finding these objects assuming a new importance, when regarded in the light of Evolutionism. For the author is an ardent evolutionist, and makes frequent use of that philosophy to speculate on derivations, relationships, and general embryology. We can but faintly indicate the fresh and delightfully new avenues of thought which Mr. Moseley's book opens out. Nothing is neglected—physics, physical geography, geology, mineralogy, botany, zoology, anthropology; in each of these departments the reader will find abundant reflections. The "Challenger" expedition has not been so successful in results as its friends desired it, and all confess to a disappointment. We cannot but think, however, that Mr. Moseley's "Notes" will do more than anything which has yet publicly appeared to restore confidence in the scientific results of the celebrated voyage.

Flowers and their unbidden Guests, by Dr. A. Kerner; translated by Dr. W. Ogle (London: C. Kegan Paul & Co.), is a well-known work, recently translated from the German. We are glad that English readers have now the opportunity of studying one of the most delightful books that have yet appeared on the mechanism and morphology of flowers. It is a veritable romance of natural history; it throws a new and poetic glamour about the simplest flower of the roadside. We have already learned how flowers have been coloured and perfumed and differently shaped, in order to attract useful insects to the necessary work of cross-fertilisation, but here we are introduced to numberless devices, by means of

which flowers (like conscious agents) are enabled to repel and refuse admission to insects, such as ants, which would rob the nectaries whilst rendering no useful services in return. The hairs and glands on stems and calyx, the fibrils on petals like those of the bog-bean (*Menyanthes trifoliata*), &c., are all intended against "forbidden guests." No one could have been better intrusted with the editing of an English edition of this remarkably original work than Dr. Ogle. It is illustrated by lithographed details of flowers whose structures are intended to repel insect pests, and we have thus rather too closely packed together no fewer than one hundred and eighteen figures.

The Physical Geology and Geography of Great Britain, by Professor Ramsay (London: Edward Stanford), is a good illustrative book of the doctrine of evolution, and "The Survival of the Fittest." This is the *fifth* edition, and it has gradually grown to its present remarkable bulk from a thin revised copy of "reporter's notes" of certain lectures on the subject. It has now attained the dignity of a *book*, after additions to each edition of new matter and fresh illustrations; and it warrants us in saying that it is the best and most readable book on the subject in the English language. When a work has reached its fifth edition, it has proved its amenity to ordinary criticism. But the numerous additions to, and the general revision of the present work have virtually made it a new book. We have read it through from back to back with fresh pleasure, although we had experienced much delight with the perusal of the more meagre third edition. We take it as a good sign when men of Professor Ramsay's position, as head of the geological survey, and also examiner-in-chief in geology at South Kensington, write books of this broad and understandable character for geological readers. We hardly need say, after the above remarks, that we cordially and earnestly recommend the work to all students.

Wild Sports and Natural History of the Highlands, by Charles St. John. (London: John Murray.) This is a new and illustrated edition of a work which sportsmen-naturalists have long placed on their shelves, side by side with Gilbert White's "Selborne." We are thankful that the publisher has issued such an attractive edition as is likely to make this most enjoyable book known to readers, who perhaps are not aware of the treat in store for them on perusing it. It is one of the "classics" of our zoological works, full of mountain air, out-door adventures, and observations, and in full sympathy with life of all kinds. This edition is *de luxe*. Apart from the excellency of the clear type, the woodcut illustrations are gems of art, for among the artists are Harrison Weir, Charles Whymper, A. C. Corbould, A. H. Collins, A. T. Elwes, and J. W. Whymper. The reperusal of this most delightsome book, under these advantageous circumstances, has been as refreshingly interesting as lovers' quarrels.

Six Months in Ascension, by Mrs. Gill (London: John Murray), gives a popular and very readable description of the islands of that name, and of the expedition thither to determine the correct distance of the earth to the sun. There is a capital preface by the husband of the authoress, Mr. David Gill, giving the history of solar measurements. Some people have complained that astronomers should differ to the extent of a million or two of miles as to the correct distance of the sun from us, but Mr. Gill well puts this, when he tells us that if any one desires to form an adequate idea of the difficulties of measuring the sun's distance to a million of miles, he can best do it by trying to measure the thickness of a florin-piece looked at, edge on, a mile off. We may regard Mrs. Gill's book as the best account of the history of, and the reason for, the recent Venus' Transit Expedition yet published.

Geological students and others ought to be thankful that the best man in England for such a task has been selected to write an elementary text-book of Petrology, a subject too little studied by English mineralogists. *The Study of Rocks*, by Frank Rutley, F.G.S. (London: Longmans, Green, & Co.), is the name of this new and cheap little manual. It supplies a great want; one attempted very successfully in Mr. G. H. Kinahan's "Handy Book of Rock Names," but still not properly met before. Petrology has been gaining ground in England, and this text-book comes in the very nick of time. In it the student will find full instructions as to how to collect and arrange rock specimens, and to cut and prepare sections for microscopical examination.

Practical Geology, by W. Jerome Harrison, F.G.S. (London: W. Stewart & Co.), is a cheap little manual, admirably adapted to teacher's classes, and to young and earnest students. The author is a well-known geologist, who has had sufficient experience in geological teaching to know exactly what a student wants, and how those wants are to be supplied. This little book deals a good deal with field geology, and thus enables the reader to sally forth and intelligibly understand what he sees. Once a lad has done this, he is a geologist henceforth. There are few of the numerous elementary text-books of geology, that we can commend more than this of Mr. Harrison's.

Baths and Bathing, and *Personal Appearance in Health and Disease* (London: Hardwicke & Bogue), are two additional little volumes of the now well-known "Health Primers." No family library ought to be without these cheap, attractive, and well-printed little volumes. Each is an authority on the subject it treats upon, for the authors are among the most eminent. We cannot wonder, therefore, at the great success of this speculation. The price of each "Primer" is only one shilling, and as they deal with almost every subject affecting health and disease, and are written in a plain and intelligible manner, there

is no longer any excuse for being ignorant of what ought most to concern us.

The volumes issued by the United States Geological Survey, under Dr. Hayden, indicate as great industry as their subject-matter does diligence in the field. The *Tenth Annual Report* is just to hand, in a bulky volume, well stored with maps, sections, and other illustrations, of the geological and geographical survey of Colorado and the adjacent territories. It is in reality a report of the progress made by the survey in the year 1876. In it we have laborious details of the various strata and their physical condition, as well as interesting generalisations. Among the geologists who contribute to the "Reports," are Dr. C. A. White, Professor Endlich, Dr. A. C. Peale, W. H. Holme, A. D. Wilson, H. Gaunett, Professor Lesquereux, A. S. Packard, Dr. Hoffmann, and others. The archæology of the area surveyed is detailed, as well as the geography, geology, botany, zoology, &c. *The Birds of the Colorado Valley*, by Dr. Elliot Coues, is another bulky volume of this survey series, detailing the scientific and popular information concerning North American ornithology, by the naturalist best fitted for the task. Will the English government ever learn to be less niggardly and mean with the works published by the members of our own geological survey? At present, by the high price demanded for the volumes, and the stint with which they are issued to scientific journals for review, they appear to be doing their best to withhold the scientific information from that public who have already been taxed to pay for it.

ANOTHER FUNGUS RAMBLE IN EPPING FOREST.

By Dr. De Crespigny, Author of "A New London Flora," &c.

[*Continued from page* 6.]

WE find no fungus in our collection referable to the family of Hydnei: some of the stemless and resupinate forms are common enough on dead wood and fallen branches, but *Hydnum repandum*, an edible species with the habit of an agaric, has to the best of our knowledge not been reported as occurring in Epping forest; but, as we gathered a specimen in Highgate wood a year or two ago, it may not improbably be met with also in the forest; it will be recognised by the close-set series of spinous processes over which the hymenium is spread out. The pileus, usually irregular (as in the figure), is of a pale ochre colour.

Of fungi belonging to the Auricularini we have *Stereum hirsutum* and *purpureum*, a Corticium, and *Thelephora laciniata*. In this family there are neither plates, tubes nor spinous processes: the hymenium is spread over the smooth surface of the hymenophorum, with which it is confluent. These fungi are waxy or gelatinous or mostly coriaceous expansions growing upon decayed wood or attached to dead sticks, stems, &c., many of them resupinate. *Stereum hirsutum* is very common and very variable; when young the hymenium is of a tawny yellow colour; the pileus coriaceous, reflexed, strigoso-hirsute. *S. purpureum* when fresh, has the hymenium of a pale violet hue; (on stumps of felled trees). All the many recorded species of Stereum, Corticium and the like, resemble each other; they differ merely in colour and substance, and are consequently difficult to distinguish.

Thelephora laciniata is a very singular-looking fungus; it grows upon sticks, heath stalks, and at the roots of old trees; also on leaves (or their stalks); it is of a madder brown colour, with a lighter shaded or greyish border when fresh gathered: a fibroso-squamose flat or foliaceous expansion without any cuticle, the fibres projecting beyond the margin and imparting that laciniated appearance to the plant to which it owes its name; the hymenium is inferior flocculose and papillose: the spores, as we observed them, were quaternate on sporophores.

Of the club-shaped fungi, Clavariei, are specimens of three species: *C. cristata*, *C. vermiculata*, and *C. fusiformis*; the former in damp shady parts of the forest; the second on a grassy common at Woodford; the last mentioned in open parts of the forest behind Loughton,—it has fascicled or subfascicled clavi of a yellow colour, and resembles *C. fastigiata* or *C. inæqualis;* maybe we have mistaken it for the latter species. In this family the hymenium is scarcely distinct from the hymenophorum, and covers the whole surface of the plant from the base to the apex.

In the second order of the spore-bearing fungi, the Gasteromycetes, the hymenium consisting of closely packed cells, is rolled up, in some cases, as it were into a sac or ball called peridium, and not until the rupture of this by decay or otherwise, are the cells exposed and the spores liberated. Of the Trichogastres, which contain the typical forms of the family, we have examples in three kinds of puffballs: *Lycoperdon gemmatum*, *Scleroderma cepa* and *S. verrucosum*. The peridium of the former genus is membranous; that of the latter is hard and coriaceous: both genera occasionally exhibit a warty character in the integuments, *L. gemmatum* especially so (see fig. 68). "The hymenium occupies the surface of innumerable sinuses, folds and cavities, all closely compacted into a crumblike mass, the stem being a continuation of the barren cells" (Berkeley). In Scleroderma the hymenium is traversed by veins, and the spores are larger than they are in Lycoperdon.

In the Phalloideæ family, the hymenium is also confined at first in a peridium which differs from that of the preceding family in that there is an intermediate gelatinous layer between its coats. The stipe in its undeveloped condition has the large cells or cavities of its parenchyma compressed; but they are obvious

E 2

enough when bursting through the volva : it attains a growth of from four to six inches. The hymenium is deliquescent when mature :—*Phallus impudicus ;* frequent, and when not visible to the eye, sensible, by the sickening odour which it diffuses, to the smell.

On a hedge bank at Chingford Hatch, near Woodford, some years ago, we gathered specimens of a curious plant belonging to another family of the Gasteromycetes, viz., *Nidularia striata* (may be there now) ; the peridium, or rather the receptacle, in this tribe is open and cyathiform when fully developed, and the spores though produced on sporophores, are compacted into little globose bodies, of which there are several in each receptacle, and each of them attached by a filament to its base. These plants are gregarious ; something of similar growth may be observed on the fronds of certain species of Marchantia.

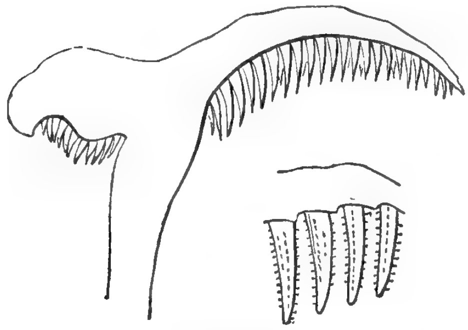


Fig. 62.—*Hydnum repandum ; a.* spines magnified.

Fig. 63.—Smooth hymenium and strigoso-hirsute pileus of *Stereum hirsutum.*

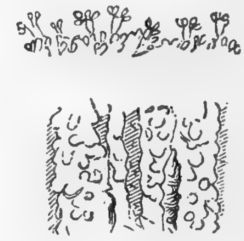


Fig. 64.—Papillose hymenium and spores of the same, quaternate on sporophores.

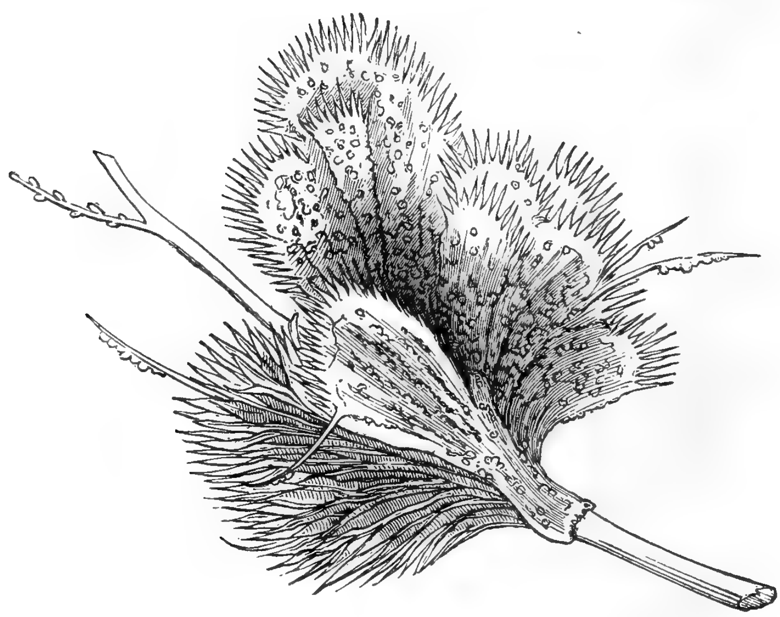


Fig. 65.—*Thelephora laciniata* (upper and under surfaces).

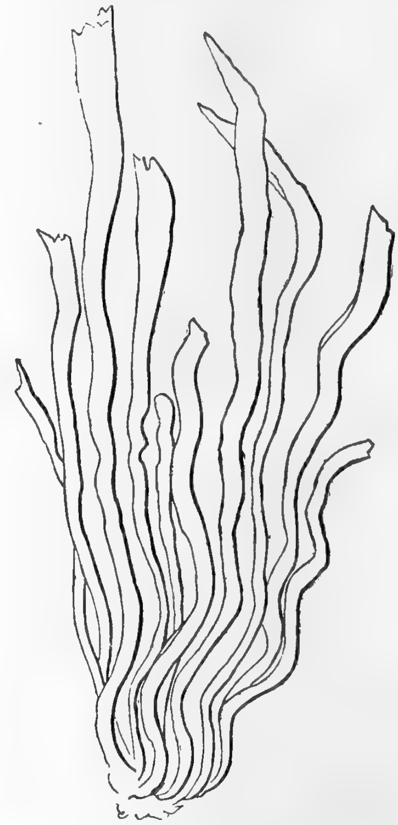


Fig. (6.—*Clavaria fusiformis.*

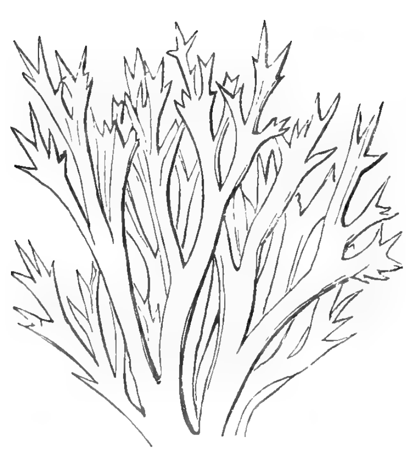


Fig. 67.—*Clavaria cristata.*

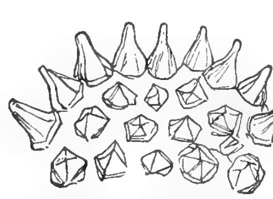


Fig. 68.—Spinulose warts on the cuticle of *Lycoperdon gemmatum* (enlarged).

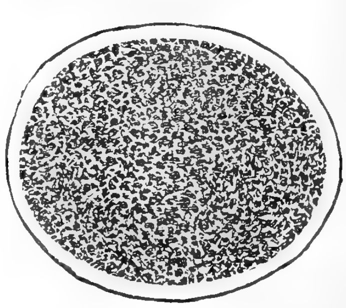


Fig. 69.—Section of a *Scleroderma,* showing the central purplish-black mass of cells.

Of the Ascomycetous order, also, we found a few interesting fungi, viz., *Xylaria hypoxylon,* from the base of an old gate-post ; *Peziza vesicularis,* from a dunghill ; and a Sphæria or two from the dead branches of trees. The fructification in plants of this order consists of sporidia (compound spores) enclosed in cases called asci, either free or immersed in the substance (stroma) of the fungus.*

Peziza vesicularis is common : the matrix is rotten hay or straw haulms. The sporidia are eight in number, and, closely packed with the

* Similar to what obtains in lichens, except that no shields are developed for the purpose.

asci, which contains them, are barren or empty asci, called paraphyses.* The cups are of a brownish colour, not unlike very thin gutta percha, brittle, the hymenium soft and velvety from the compact layer of asci with which it is covered. *Xylaria hypoxylon* has the habit of Clavaria; it is black, greyish at the summit, hairy below. The horny receptacles in which the asci are contained are called perithecia.

Sphæria is something of a lichen in its habit of growth. The genus has been of late years split into several sub-genera: the distinctions are difficult to make out; we refrain therefore from naming our specimens, and confine ourselves to remarking that they are black excrescences usually found on the bark of dead branches of trees, with carbonaceous perithecia, pierced at the apex and mostly papillate. The higher forms of these Ascomycetous fungi are represented by the truffle and morel. The types of other families belonging to the order are Hypoxylon and Phacidium. Specimens of Phacidium we found upon the leaves of a sycamore tree at Woodford. We would also observe that the "perithecia" of the Ascomycetes proper must not be confounded with the "sporangia" of a section of moulds which comprise the family of the Physcomycetes associated with them. These growths are forms which should occupy a position intermediate with the Hymenomycetes: the contents of these "sporangia" are simple spores, not sporidia. Of the rust, smut, mildew, mould (not physcomycetous) and other microscopic growths found upon vegetable matter of different kinds which compose the Coniomycetous and Hyphomycetous orders, we have also two curious growths belonging to the latter, viz., Sapedonium, yellow boletus mould as it is called; an agency by which one fungus is converted into a mass of spores produced by another; frequent: and Tubercularia (fam. Stilbacei), little excrescences on dead wood; they are composed of compacted threads; also frequent. In conclusion we would refer those of our readers who may be interested in microscopic mycology to the splendid work of the brothers Tulasne on the subject, in which the growth of the reproductive agency from the tissue, and various forms it assumes are most admirably figured and described, while Epping Forest, well explored, will afford abundant material for study.

Fig. 70.—Vertical section of *Phallus impudicus*, in the young state, showing the hymenium, gelatinous intermediate layer, and undeveloped stipe.

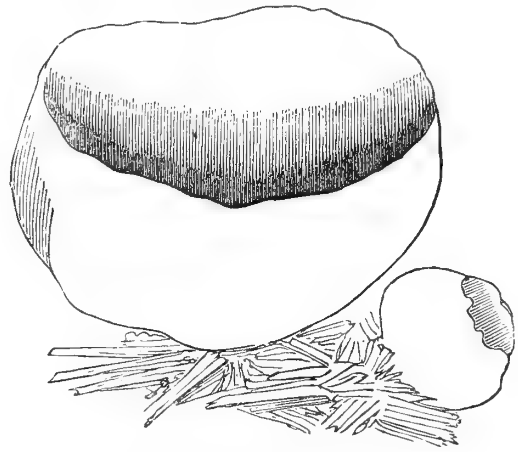


Fig. 71.—*Peziza vesicularis*.

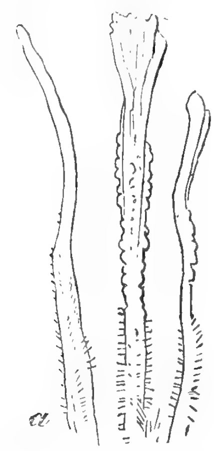


Fig. 72.—*Xylaria hypoxylon*.

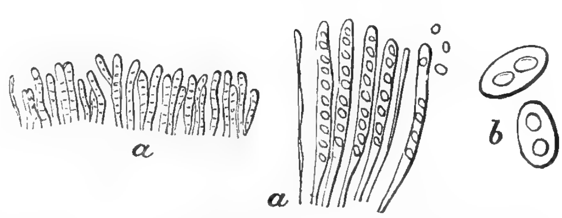


Fig. 73.—Asci of *Peziza vesicularis*; *b*, sporidia: all magnified.

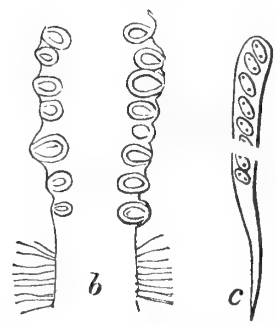


Fig. 74.—*Xylaria hypoxylon*; *b* vertical section showing the perithecia; *c* an ascus of the same containing sporidia.

P.S.—At page 254, No. 167, *erratum*. *Pleurotus*: add, "Stem, when present, lateral or excentric."

NOTE.—*Pholiota aureus*: said not to be the true species known by this name and very rare, but an allied form, *P. spectabilis*.

(*Concluded.*)

* Besides these, simple cells, called gonidia, attached to simple filaments, have been observed in these as in most kinds of fungi.

LIMESTONE AS AN INDEX OF GEOLOGICAL TIME.

THIS is the title of a paper recently read before the Royal Society, by Mr. T. Mellard Reade, C.E., F.G.S. The author showed that the geological history of the globe is written only in its sedimentary strata, but if we trace its history backwards, unless we assume absolute uniformity, wes arrive at a time when the first sediments resulted from the degradation of the original crust of the globe. There is no known rock to which a geologist

could point and say "that is the material from which all sedimentary rocks have been derived," but analogy leads us to suppose that if the earth had an igneous origin, the original materials upon which the elements first began to work were of the nature of granite or basalt. From a variety of considerations drawn from borings, mines, faults, natural gorges and proved thicknesses of the strata of certain mountain chains, the author arrives at the conclusion that the sedimentary crust of the earth is at least of an average actual thickness of one mile, and infers from the proportionate amount of carbonates and sulphates of lime to materials in suspension in various river waters flowing from a variety of formations, that one-tenth of the thickness of this crust is calcareous. Limestone rocks have been, geology tells us, in process of formation from the earliest known ages, but the extensive series of analyses of water made by Dr. Frankland for the Rivers Pollution Commission, shows that the later strata in Great Britain are much more calcareous than the earlier. The same holds true of the continent of Europe, and the balance of evidence seems in favour of the supposition that there has been on the whole a gradual progressive increase or evolution of lime. The "Challenger" soundings show that carbonate of lime in the form of tests of organisms is a general deposit characterising the greater part of the ocean bottoms, while the materials in suspension are, excepting in the case of transport by ice, deposited within a distance of 200 miles of land. This wider distribution in *space* of lime, the author thinks, must also profoundly influence its distribution in *time*, and he shows this by example and illustration. It can also be proved to demonstration that the greater part of the ocean bottom must at one time or another have been land, else the rocks of the continents would have become gradually less, instead of more, calcareous. Thus the arguments drawn from the geographical distribution of animals are reinforced by physical considerations. The author goes on to show that the area of granite and volcanic rocks in Europe and the part of Asia between the Caspian and the Black Sea, as shown in Murchison's map of Europe, is two-twenty-fifths ($\frac{2}{25}$) of the whole; much of this is probably remelted sediments and some of the granites the product of metamorphism. From considerations stated at length it is estimated that the area of exposures of igneous to sedimentary rocks would be for all geological time liberally averaged at one-tenth ($\frac{1}{10}$) of the whole. These igneous rocks are either the original materials of the globe protruded upwards, or they are melted sediments, or a mixture of the two. The only igneous rocks we know of are of the nature of granites and traps. If these rocks do not constitute the substratum of the earth, and all known rocks, igneous as well as sedimentary, are derivative, either geological time is infinite, or the rock from which they are derived is, so far as we know, annihilated geologically speaking, and we have no records of it left. If we assume the latter as true, the past is immeasurable, but in order to arrive at a minimum age of the earth, the author starts from the hypothesis that the fundamental rocks were granitic and trappean. From eighteen analyses by Dr. Frankland, it is shown that the water flowing from granitic and igneous rock districts in Great Britain contains on an average 3·73 parts per 100,000 of sulphates and carbonates of lime. The amount of water that runs off the ground is given for several of the great continental river basins in Europe, Asia, Africa, and America. The annual depth of rain running off the granitic and igneous rock areas, taking into consideration the greater height at which they usually lie and the possibility of greater rainfall in earlier ages, is averaged at twenty-eight inches, and the annual contribution of lime in solution in the forms of carbonates and sulphates at seventy tons per square mile. With these elements, and giving due weight to certain physical considerations that have been urged in limitation of the earth's age, the author proceeds to his calculations, arriving at this result, that the elimination of the calcareous matter contained in the sedimentary crust of the earth must have occupied at least 600 millions of years. The actual time occupied in the formation of the groups of strata as divided into relative ages by Professor Ramsay, is inferred as follows:—

	Millions of years.
Laurentian, Cambrian, and Silurian . . .	200
Old Red, Carboniferous, Permian, and New Red	200
Jurassic, Wealden, Cretaceous, Eocene, Miocene, Pliocene, and Post-pliocene . .	200
	600

The concluding part of the paper consists of answers to objections. The author contends that the facts adduced prove geological time to be enormously in excess of the limits urged by some physicists, and ample to allow on the hypothesis of evolution for all the changes which have taken place in the organic world.

ON ALTERNATION OF GENERATIONS.

THIS term—used in botanical works to express a consecutive series of phases exhibited in a marked manner by most flowerless plants before reaching maturity—is a very unfortunate one, implying that each form in the series is an individual, which is erroneous. The following description of the successive stages in the growth of a fern shows what the term "alternation of generations" is intended to convey. The spore, under favourable conditions, gives origin to a minute green leaf-like body called a *prothallium* or *proembryo*, bearing antheridia and archegonia (the former corresponding to the stamens, the latter to the pistil in flowering plants), the last containing a special cell, the *oospore*, which after

fertilisation with the antherozoids that have been produced by the antheridia (corresponding functionally with the pollen of flowering plants), germinates and gives origin to a fern plant which produces spores, each capable of giving origin to a similar cycle of changes. In this case there are two so-called generations, the first commencing with the germination of the spore and terminating with the production of the fertilised oospore, at which period the prothallium perishes, this is styled the sexual generation, because the oospore—equivalent to the fertilised ovule in flowering plants—is the *direct* result of fertilisation; the second generation commences with the germination of the oospore and ends with the production of spores on the fern plant, this is the asexual generation, because the spore is not the result of direct fertilisation, and when sown could not give origin to a fern plant without previously producing the sexual prothalloid form. In this instance we have clearly represented only one generation, not two; when once growth has commenced with the spore it goes on uninterruptedly until another spore is formed, the fertilised oospore, which is said to terminate the first generation, not possessing the power of remaining in a state of dormant vitality, as is the case with the seeds of flowering plants, and which marks the end of the individual that gave origin to the seed, but this property is possessed by the fern spore, therefore one generation includes all the changes from the germination of a spore until the production of another similar one. The term "alternation of generations," so far as concerns the vegetable kingdom, simply expresses the fact that when active life has commenced, a series of changes in form and function must be passed through before the starting-point can be again reached, or in other words before a body capable of giving origin to a similar cycle can be repeated. In fungi the "generations" are frequently several in number, but they do not always follow in the same order, the appearance of any one appears to be determined by surrounding causes, so that the plant possesses the property of repeating itself under widely different conditions. In ferns we have seen that the sexual generation is microscopic and disappears—except the oosphere—before the appearance of the large asexual form or fern proper; in mosses, on the contrary, the sexual generation—the leafy part of the plant—is largest and frequently perennial, giving origin to several asexual generations—the capsules. The terms prothallus or pro-embryo are vaguely defined, the latter signifying everything produced anterior to the embryo, consequently when a bulbil of *Lilium bulbiferum* developes into a plant the whole represents a pro-embryo, as would also a potato plant originating from a tuber, both would also be examples of asexual generations, whereas plants produced from seeds of the above would constitute the sexual generation.

G. E. MASSEE.

A CHAPTER ON FISH PARASITES.

BY JOHN DAVIES, F.R.M.S.

FISH parasites are a subdivision of the Entomostraca, and are divided into several species. viz.: The Caligulus, having a sucking mouth and a regular series of legs. They are sometimes called "suctorial crustacea." The Argulidæ, which principally infest fresh-water fish. The body is covered with an oval shell, the abdomen is exposed. It has a pair of sucking discs, or feet-jaws, and four pairs of legs more or less articulated and generally plumose. These parasites undergo a number of remarkable changes and cast their shells at frequent intervals. If a limb is lost it is replaced at the next moult, same as crabs, lobsters, &c. These castings take place at intervals of two or three days during some periods of the year. The Argulidæ are mostly found on fish in a weakly state, or on those that have met with some accident, which causes them to be more than usually sluggish; or on those that are by nature inert. The carp offers a striking example of the latter class, and the fact of its being more than usually infested has given rise to a proverb. I do not think the fish suffer in any way from the presence of these creatures—on the contrary, if they feed on cutaneous secretions, it must benefit their host, from a "hygienic point of view."

These parasitic crustacea are very quick in their movements over their hosts, being able to travel backwards and forwards with equal facility. Their peculiar mode of swimming has been described as a "series of tumblings over and over, and darts in a straight line with great rapidity." The fish seem to have a great aversion to these messmates as an article of food, for if by chance one gets down the throat of a fish it immediately ejects it again, and would rather starve than eat it. The female has generally two long oviferous tubes for depositing her eggs (see Article in SCIENCE-GOSSIP, page 33, vol. 1878).

When the young animal comes forth it resembles the Cyclops, and by successive moultings attains the adult form. These metamorphoses do not apply to the males, as they scarcely alter in form and only slightly increase in size.

It is a curious fact that most of these animals when first hatched bear a great resemblance to the creatures immediately below them in point of organisation. Their cast-off shells, after being cleaned by the myriads of minute scavengers (Monads) form most beautiful objects for the microscope. They should be examined with the half-inch objective in conjunction with the spot lens, and as permanent objects can be preserved in a solution of chloride of calcium, or glycerine-jelly.

There is a great difficulty in examining these small crustacea as they soon perish after leaving their native element, and in fact they seem bent on committing self-destruction, as they generally climb out of the vessel in which they are placed, and soon end their existence. The Caligulus was first-mentioned by

Baldner, a self-taught naturalist (a fisherman) of Strassburg, about 1700. In 1740, Frisch, in his "Insecten in Deutschland," describes it as Fisch-laus. Linnæus in his "Systema Naturæ," mentions it as the *Monoculus foliaceus*. The best description, however, is given in "Ann. et Mus. d'Hist. Nat." for 1806, and at the present time this article is largely quoted. The Argulus was first noticed about fifty years after the Caligulus, and several mistakes seem to have been made, one author actually mistaking the tail for the head. This was a pardonable blunder, as the use of the microscope was little known in those days. It, however, led to a great amount of confusion, as each writer, copying the remarks of those before him, caused an accumulation of errors. Milne-Edwards' "Hist. Nat. des Crus." gives a full and good description in 1840, and since that time several American and Continental writers have greatly increased our knowledge on the subject.

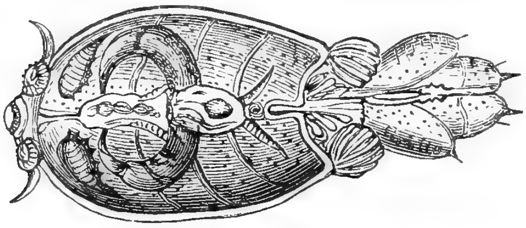


Fig. 75.—Parasite of wrasse (ventral view). Scale, ⅛ inch.

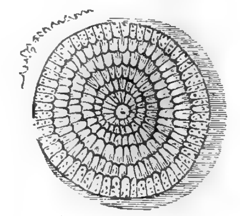


Fig. 76.—Sucker of parasite of wrasse; × 310.

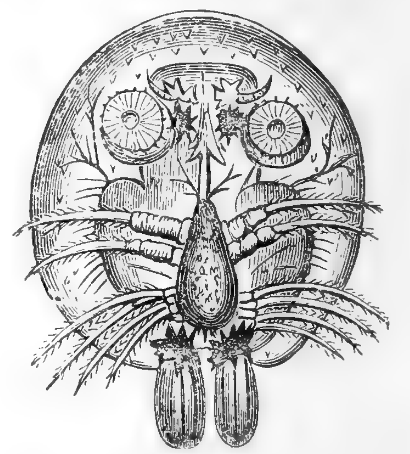


Fig. 77.—Parasite of bass (ventral view); × 25.

The following is a description of two minute parasitic crustacea which were taken from living specimens, and which differ in some particulars from any hitherto recorded. They give but a vague idea of the wonderful organisation and beauty of form of these minute beings, which are so perfectly adapted to perform all the functions designed by Providence for these lowly creatures.

This parasite (fig. 75) is oval and slightly convexed. It is divided into two parts, the thorax and the abdomen; the thorax coalesces with the hind part, which is sometimes, but erroneously, called the tail. The posterior part contains the swimming-legs. In this individual the thorax is composed of a shelly carapace strengthened by a series of bands diverging from the centre. This shell extends to about three-fourths of the length of the parasite. The remainder consists of four segments of a soft sarcode interspersed with small pink puncta.

The last pair of segments has a distinct band which serves to divide it transversely. A pair of sternal forks is placed at the termination of the abdomen. The cephalo-thorax is composed of a shelly transparent substance, and according to Pickering and Dana, is formed of two layers or substances. The head is blunted and contains a pair of antennæ, which in some individuals is at right-angles, and in others is turned upwards. Between these antennæ and the centre of the head is a pair of lunules or sucking-discs (see fig. 76) which are composed of about six layers of bronchial lamellæ finely marked, and are used for sucking the juices of the fish, or from the mucous products secreted by the skin. Between these suckers is a round sinus, whose functions I do not know; from near this opening commences the alimentary canal, which runs through the centre of the parasite, throwing off "cæcal prolongations," and terminating between the caudal appendages, where is situated the cloaca.

The primary canal contains the œsophagus, stomach, and intestines. Below the sucking discs is a pair of foot-jaws serrated in their inner edges, which are used for masticating the food. In the centre of these jaws is situated the mouth. Leydig describes the mouth in the *Argulus foliaceus* as follows: "The opening of the mouth is placed in a club-shaped projection bent downwards. It is divided posteriorly by a crescent-shaped lower lip, anteriorly and laterally by two broad gradually tapering plates, several disc-like pieces inside representing the mandibles."* M. T. Thowell observed "two small teeth."

A little below the gullet is a pair of thoracic feet graduating from the carapace to the termination, and curved so as almost to meet at their extremities. These legs are covered with a series of triangular scales, which gives them the appearance of being irregularly segmentated. Under these locomotive appendages is another pair, much thinner and turned towards the posterior. Between the shell and the abdominal part is a pair of fan-shaped fins composed of six cartilaginous ossicles and covered with a fine membrane. These parasites have two simple oval eyes. This Caligulus was taken from the Green Wrasse (*Labrus lineatus*). Colour, *opal white, with dark crimson* markings. Fig. 77 is an individual of the genus Argulidæ; there are only two or three species known. It is of a pale green colour and about $\frac{1}{15}$ inch each way, being nearly round. The membranous carapace is covered with a peculiar V-shaped marking, and forms a shield over the whole of the body. The fore-part is obtusely round, it has a pair of perfect eyes, very dark and brilliant;

* On the "Morphology of the Argulidæ," 1866.

antennæ above the eyes, short and pointed, and are scarcely seen. Between the eyes commences the alimentary canal, which leads to a long oval dark mass, which is supposed to contain the mouth, œsophagus, &c.

Situated on either side of the optic nerves is a pair of remarkable organs which are both legs and suckers, according to Dr. Baird* they are: "The anterior pair or second pair of foot-jaws, and of a peculiar construction. They are in the form of short hollow flexible cylinders . . . . having a membranous margin and figured all round with membranous rays . . . . by this organisation the animal can make use of them as real suckers or cupping glasses and fasten itself to the fish on which it lives, and also to walk with when it wishes to change its position. By contracting these muscles it can exhaust the cavity of the sucking disc, producing a vacuum, and this enables it to adhere firmly to the surface upon which it is placed." By Dana and Herrick they are called "prehensile feet." About midway are placed two pairs of long and beautifully formed legs, and further below are four more pairs also plumosed and carried towards the posterior.

The abdomen consists of a pair of lobed oval appendages, or perhaps egg-corpuscles, and are marked with longitudinal lines about eight in number.

At the commencement of these ovate organs are two bright crimson star-shaped markings which are said not to be observable in the male. Between these appendages terminates the intestine canal, and here is situated the anal orifice.

This species was found on the gill of the Bass (*Labrax lupus*).

ON THE MITE OF THE HUMBLE BEE GAMASUS.

I SHOULD like to draw the attention of students of the Arachnoida to a minute mite, which I have frequently found parasitic on the *Gamasi* infesting queen humble bees. I first noticed it, I think, in the spring of 1877. I suppose it must be the *Hypopus* (whatever that may be) of Gamasus, but it differs so remarkably from all other Hypopi that I have seen, or indeed from all other mites with which I am acquainted, that I should like to know more about it. I have found as many as seven specimens on a single Gamasus. The humble bee on which I first found it in 1878 was the *Bombus virginalis* of Kirby. It moves about on its host with tolerable speed, giving one an idea of a pigmy tortoise; it is covered with a shield of a brownish-yellow colour, like some specimens of resin, shining, and very evidently divided into an anterior or cephalic, and posterior or dorsal portion. The legs are very remarkable, the anterior pair being rather short, broad and flattened, and each front leg is provided with a peculiar and large single claw, like that found on the three first pairs of legs of *Trichodactylus Osmiæ*, from which mite it differs also, in having the chitinous shield, instead of the corrugated skin so characteristic of the Sarcoptidæ. The second and third pair of legs are much finer, rather longer, and furnished with a double claw and large pad. The hind legs terminate in a few long stiff hairs, somewhat like *Trichodactylus*, only in that creature there is but a single terminal hair to each hind leg. The mouth

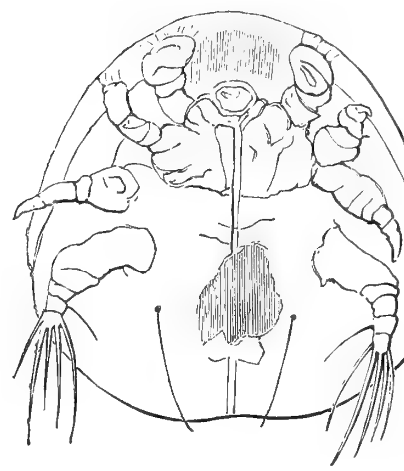


Fig. 78.—Mite from Gamasus of Humble bee; × about 220.

Fig. 79.—Front leg *(a)* with claw, middle feet *(b)* and pad, and hind leg *(c)* of Gamasus.

Fig. 80.—Scale, $\frac{1}{1000}$ inch.

parts I have not been able to make out satisfactorily, but it appears to be furnished with two bristles, as in *Hypopus muscarum*. The abdomen gives one an idea of segmentation.

The readiest way of finding them, is, first to catch the early queen humble bees when they frequent the catkins of the sallow: these are almost invariably invested with the desired Gamasus (which is exactly like *G. coleoptratorum*). Place one of the bees under a wine-glass, or tumbler, and introduce a small piece of blotting paper moistened with hydrocyanic acid. This will speedily kill the bee, but

* "Natural History of British Entomostraca."

* Their structure is simple and fructification though various in power, always sporiferous.

before it is quite dead, the Gamasi will leave it, and run about in all directions; as soon as they are stupified, examine them one by one under the microscope, when the hypopi if present, will be found attached to some portion of the Gamasus, and may be removed, with care and some trouble, by using a dissecting needle. On placing one or more on a glass slip, and waiting a little while, it will be found that they are not dead (unless they have been exposed to the vapour of the acid for too long a time) and when they come round, they will walk with tolerable ease on the glass, although the front pair of legs are of very little use to them under such circumstances; and this is the most favourable time for observing the large claw, for in walking on glass it is protruded a little way beyond the shield. When alive on the Gamasus they cling to it by means of these large claws, and in this state, the claw or leg will often be torn off in trying to remove them with the needle.

I have not the works of Dujardin or Claparède on this subject; but if any reader of SCIENCE-GOSSIP possesses them, and would kindly lend them to me for a short time, I would take great care of them, and gladly pay the carriage of them both ways.

Kirton Lindsey. C. F. GEORGE.

THE HISTORY OF RHUBARB (*RHEUM*).

By H. G. GLASSPOOLE.

RHUBARB is a plant belonging to the Polygonaceæ, the same order as the common dock and buckwheat, to the latter family of which it belongs. The use of the roots of this plant for medicinal purposes is of great antiquity, and it is uncertain to whom mankind are indebted for the discoveries of its virtues. Its valuable properties appear to have been known to the Chinese long before the Christian era, as it is stated in the Pharmacographic that this drug is treated of in the herbal called Pen King, which is attributed to the Emperor Shen-mung, the father of Chinese agriculture and medicine, who reigned about 2700 B.C. Dioscorides, physician to Antony and Cleopatra, wrote on its qualities, and recommended it against weakness of the stomach, diseases of the liver; and as an external remedy, he mentions it as a cure for ringworm, if it be mixed with vinegar and the place be anointed with it. Dioscorides says the rha, by some called rheon, grows in those countries which are beyond the Bosphorus, and from which it is brought. It is a root which is black externally, like the great centaury, but smaller, redder, odourless, loose or spongy, and somewhat smooth internally. The Greek physicians of a later date, as Alexander of Tralles, and Paulus, of Ægina, have written upon its virtues; and Pliny gives a similar account as that of Dioscorides to a plant which he calls rhacoma. The ancient Arabs were acquainted with this plant; one of their authors, Mesne the younger, mentions three kinds—the Indian, the Barbarian, and the Turkish. The recommendations of the medicinal virtues of this root by later practitioners would fill many volumes; as an article of commerce it has been of considerable importance for many centuries. All the species of rhubarb are natives of Asia, and grow spontaneously on the elevated lands of Tartary, Tibet, India, &c., and also on the banks of the Volga. We have no account of this plant being cultivated in England before 1629, although it is stated in some of our old works on gardening that the leaves of rhubarb were commonly used as a pot-herb in the reign of Elizabeth, and considered superior to spinach. Tusser also mentions it as a medicinal plant for the "Herbe garden;" this was no doubt monk's rhubarb, mentioned by Gerard as grown in his garden and others in London and elsewhere for the use of "phisick" and "chirurgerie." He calls it "*Rhubarbarum monachorum*, Monks' rhubarb." This plant did not belong to any species of rheum, but appears to be *Rumex alpinus*, an Alpine dock which grows in Switzerland and Germany, the root being more astringent than purgative, is used by the monks of the Alps to adulterate the true drug. Although we have no account of the cultivation of rhubarb before the date previously mentioned, the seeds of the plant appear to have been sent to this country as early as 1534, for in a postscript of a letter of the above date, from that eccentric physician Andrew Broide (or Brode) to Cromwell, secretary of state to Henry VIII., he says, "I have sent to your Mastership the seeds of reuberbe, the which came out of Barbary. In those parts it is considered a great treasure." He also gives directions for sowing and transplanting the roots, at least two hundred years before the cultivation of it was known in England.*

Rheum rhaponticum, the common garden rhubarb, was first grown in this country in 1629 by Parkinson, who informs us that the seeds were sent him from beyond the seas by a worthy gentleman named Dr. Matt Lister, one of the king's physicians, and first grew with him before it was ever seen or known elsewhere in England,† but it was only grown as a curiosity or for medicinal purposes, and was not generally cultivated: as we find Professor Bradley, in his "Husbandry and Gardening," published in 1724, saying, "I could wish that we could get some of the true rhubarb, if possible, for this has not yet been grown in Europe as I could ever find, though once I remember the late ingenious Mr. Jacob Robart thought he had got it."

Rheum palmatum, another species grown in gardens, was first introduced in 1763 by Dr. Mounsey, who procured the seeds from Russia. The plants were grown in the botanical gardens of Edinburgh and Cambridge, from thence they were quickly dispersed

* Ellis, "Original Letters," 3 ser. vol. ii. p. 300.
† "Parad." 484.

over the island. Pennant, in his second tour in Scotland, 1769, mentions having seen large quantities of rhubarb being cultivated on the wild tracts of that country by way of trial to see if it would succeed as well there as in manured soils.

Mr. Charles Bryant, of Norwich, gives an interesting paper in the "Gentleman's Magazine," 1766, p. 444, on a plant of *R. palmatum*, grown in his garden in Magdalen Street. After giving a botanical description of it, he proceeds to say that about the end of May the flowers were almost all blown to the very top of the flower-stem, and the whole consummated a scene which not only merited the inspection of the curious botanist, but gave delight to the delicate eye of the most luxurious florist. The seed that produced this plant was sown in the open ground in the botanic garden here (Norwich), April, 1763, where it stood and flourished till November, 1765, when it was taken up. A piece of its root came off, which was copiously stored with a fine thickish saffron-coloured juice of a very agreeable aroma to smell, so volatile that it scented the whole garden. Half-an-ounce of this fresh root, thinly sliced and steeped twenty-four hours in half-a-pint of gin, made a most agreeable sparkling saffron-coloured tincture, about half a gill of which, taken upon an empty stomach, was found a very good cordial.

R. rhaponticum was largely cultivated for medicinal purposes at Banbury, Oxfordshire, in 1777, by Mr. Hayward, who was rewarded by the Society of Arts in 1789 with a silver, and in 1794 with a gold, medal for the excellency of the drug he produced. The same society also presented Sir W. Fordyce a gold medal for raising rhubarb from seeds in 1792.

It was not, however, until the beginning of the present century that the stalks of rhubarb became an article of commercial importance in the London and other vegetable markets in the kingdom. About 1810, Mr. Myatt, of Deptford, sent two of his sons to the Borough market with five bunches of rhubarb stalks, of which they only sold three, people not liking what they called *physic pies*. Notwithstanding, Myatt continued its cultivation. As he predicted, it soon became a favourite; and now hundreds of tons' weight of rhubarb are sold in Covent Garden in the course of the year, and what amount in other markets all over the country it is impossible to calculate.

The various uses of this plant in the kitchen department is well known. The petioles in the spring and early summer are employed in tarts, &c., and when the leaf stalks are too old for cooking, the express juice from them is manufactured into a wine closely resembling champagne; indeed, much of the common champagne drunk in this country is often nothing more than a preparation from the stalks of rhubarb and the fruit of the gooseberry. The large globular pouch of unopened flowers when cooked as rhubarb form a dish of great delicacy. Its chemical composition is very complicated, and chemists have failed to discover any peculiar principle in the drug which fully accounts for its purgative properties. The analyses of Schlossberger and Döpping discovered a variety of new principles in it, among which was chrysophanic acid, a beautiful yellow substance emitting yellow vapours when heated, soluble in alcohol, its alkaline solution changing by evaporation to a violet and then to a blue. Magnificent purples also are obtained from the yellow colouring matter produced by heating rhubarb with nitric acid and then with alkalies, and it has been proposed to apply these, called erythose in the arts, as a dry stuff.* Bryant tells us a decoction made from the fresh roots of rhubarb is an excellent antiscorbutic, and in this respect is no way excelled, if equalled, by a decoction of the so much celebrated water dock, *Rumex hydrolapathum*, which is still in the present day taken for scorbutic diseases by the rustics in the Broad districts of the eastern counties. The poor in some parts of Scotland are said to apply heated rhubarb leaves to parts affected by rheumatism, which they say gives ease to the pain. The leaves are said to be used in the fabrication of fictitious cigars and tobacco.

To the botanical microscopist the rhubarb supplies excellent specimens of spiral fibrous structures, as spiral annular and reticulated vessels and ducts, the petioles, leaves, and roots contain bundles of stellate raphides, oxalate of lime (which gives a grittiness to the drug), which make beautiful objects for polarized light. The original species of *R. rhaponticum*, *undulatum*, and *R. palmatum* have now been superseded in our gardens by hybrid varieties possessing the merits of larger size, delicacy in texture, and coming earlier into use.

Rheum officinale, from which the drug is obtained, was first grown in this country by the late Daniel Hanbury, F.R.S., who sent specimens to Mr. Usher, of Banbury, where it is now being cultivated for medicinal uses. This species is a native of the south-east of Tibet. Some species of rhubarb are highly ornamental in many situations in pleasure grounds, &c., their luxuriant foliage and tall elegant spikes and flowers contrasting so singularly with most of our native plants. The generic name *rheum* is derived from *rha*, the ancient name of the river Volga, from which locality it is supposed the Greeks first received it.

FIELD MOUSE AND BEES.—I keep several hives of bees, and have placed pieces of perforated zinc about three-quarters of an inch broad at the mouth or door of each hive to prevent vermin, but the other day on going to look after the bees, I found a field mouse had entangled itself in the zinc in coming out of the hive; it was dead, and appears caught by its hind quarters, and I suppose stung to death by the bees. Is not this a very curious circumstance?—*J. Lloyd Phelps.*

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* See Ripley and Dane, "American Cyclopædia."

ON THE AMBULACRAL SUCKERS AND PEDICELLARIÆ OF *ECHINUS MILIARIS*.

By Major Lang.

Whilst residing lately at Torquay, I carefully studied the exterior organs of *Echinus miliaris*, which is to be found there in considerable abundance, under the stones at low water off Corbon Head. I allude more especially to its ambulacral suckers and those curious and little-understood appendages, the pedicellariæ.

If a dead and dry specimen of Echinus, popularly called the sea-urchin or hedgehog, is examined by a novice, he is at a loss to understand how the little creature is enabled to creep, as it does, under and over the rocks and stones in its native element.

Its calcareous shell is entirely covered and almost hidden by sharp-pointed spines, whilst the mouth, which is placed on the under side, is surrounded by a naked membrane. But if he looks carefully with a pocket lens he will perceive, between the bases of the spines, and more especially between those nearest the mouth and on the periphery of the buccal membrane, a great number of very minute discs apparently attached to or resting on the shell. These are in reality the organs of locomotion, the ambulacral suckers, which the animal can protrude far beyond the extremities of the spines by a method which will be explained presently. Now if he will rub off the spines, which he can easily do, he will see that the test or shell is composed of five wedge-shaped segments, the apices of which meet at the top, and that dividing these, or joining them, if you please, are five ribs, each of which is furnished with two rows of puncta or holes completely perforating the shell, as can be proved by simply holding it up to the light and looking through its interior; and it is on these ambulacral perforations that the tubular sarcodic tentacles, surmounted by their sucker-like disc, are attached; each of the five plates or segments of the test are covered with tubercles arranged in longitudinal rows, the summit of each tubercle being surmounted with a polished nipple, on which the base of the spine, which is slightly hollowed out for the purpose, rests, so that they form together a perfect ball and socket joint, employed therefore by nature long before man had ever adopted it.

Having learnt thus much it will be well to go down to the shore during low water, and obtain some living specimens, which, as the creatures are tolerably tenacious of life, can be brought home in some fresh seaweed. A bottle of sea water must be also procured. On arriving at home, put the Echini in a white soup plate and pour in the salt water. The beautiful lilac and green tints of the spines, as they languidly move in their sockets, will be first observed, and then many of the ambulacral suckers will be seen extended far beyond these by their diaphanous sarcodic tubes. The slightest touch will cause them to retract, but with a sharp pair of scissors that portion of the tubes beyond the spines with its suckers may be cut off, the tube however shrinking up into almost nothing towards the suckers. Remove this to a watch glass into which a few drops of water have been placed, and examine it under the microscope, when it will be seen that the sucker is strengthened by an interior circular skeleton, and that the tube has fallen into corrugated folds. Replace the water by some liquor potassæ, and let the specimen soak in it for a day or two. The potass will act upon and destroy the sarcode, and a beautifully reticulated calcareous disc or rosette with a scolloped margin and central orifice, like a delicate piece of network will be revealed, composed of from three to seven wedge-shaped segments, which, if the action of the potass be

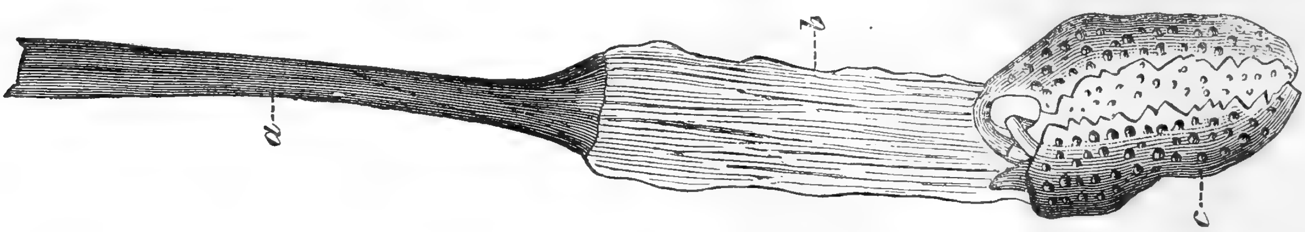

Fig. 81.—*Pedicellaria triphylla*, &c. of *Echinus miliaris*.

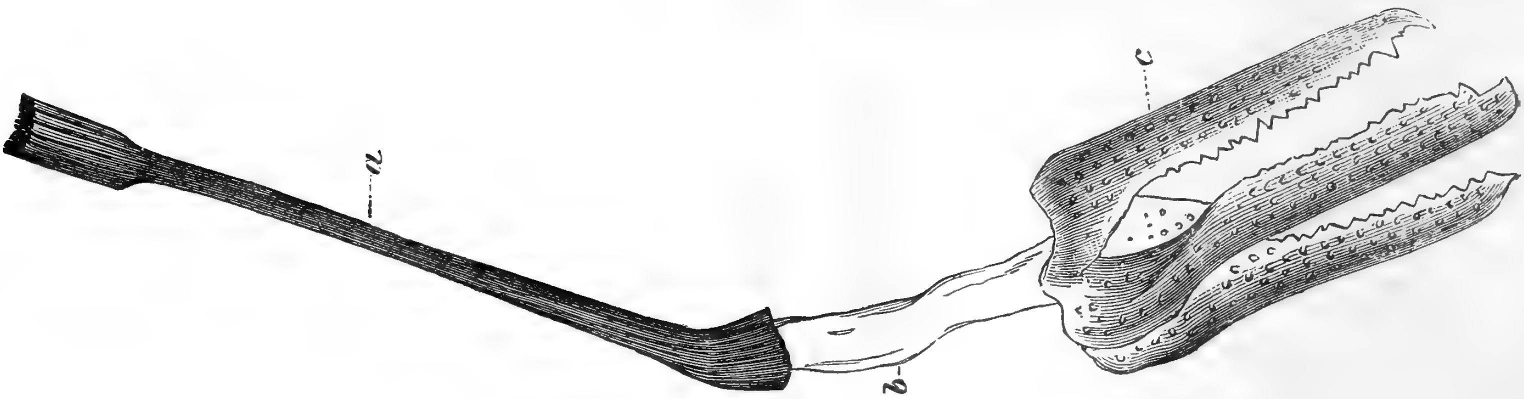

Fig. 82.—*Pedicellaria tridens*. *a*. calcareous stem, *b*. extensile neck, *c*. head.

much longer prolonged, will be separated from each other. There are a vast number of these ambulacral suckers on the entire test, and by their aid the creature not only drags itself along, but anchors itself to the rocks, and so tenaciously, that it requires considerable force to detach it; indeed, sooner than let go its hold, I have found that it will allow the suckers and tubes to be torn from it, and they have been left on the bottom of the plate to which it had been clinging. In fact this is the best way of obtaining specimens for microscopic investigation. By means of those on the upper portion of the shell the animal is able to right itself if thrown on what we may call its back, and by their aid also it can, and does often, completely cover itself with pieces of seaweed, for the purpose, I presume, of concealment from its enemies.

The method by which these suckers are extended or retracted at the creature's will is interesting. In the first place it may be seen under the microscope that the tubes are furnished with both longitudinal and annular muscles, the former for lengthening and shortening them, the latter for increasing or diminishing their calibre. I have said that there are five pairs of ambulacral rows of pores. Now if a portion of one of these meridianal primary rows is carefully examined, it will be found to consist of numerous subordinate diagonal ones, each of which is made up of three pairs of pores. The tube of the sucker covers and embraces one of these pairs, and *within* the test a muscular bag filled with fluid is attached to the same. When the sucker is to be protruded the muscles of the interior bag contract, whilst the longitudinal ones of the tube are relaxed, and consequently the fluid expelled from the bag passes through the two pores and entering the tube extends it. When it is to be retracted, the process is of course reversed; the longitudinal muscles of the tube contracting, whilst those of the bag relax, so that the fluid can re-enter it.

I need scarcely remark that in the sucker of the Echinus we have another example of a mechanical power in nature that has existed for ages, and that it has been unconsciously reproduced in the school-boys' well-known leathern sucker.

Let us now turn our attention to those extraordinary appendages, the pedicellariæ, which have always been, and still are, a puzzle to naturalists. What their functions may be, and what use they are to the animal, is still a question which will be alluded to presently. I will only remark here that similar organs are found in some of the star-fishes, and in a few of the polyzoa. The Echinus has no less than four different kinds of pedicellariæ, distinguished by the names of Triphylla, Tridens, Globifera, and Stereophylla. I have found them all, with the exception of Globifera, on the naked membrane surrounding the mouth, the latter seems to be confined to the bases of the spines, whilst Triphylla, by far the most abundant, is also scattered generally over every portion of the shell. Although the form and size of the different species differ considerably, their general plan and structure are identical. A calcareous and more or less fibrous stem, enlarged at either end like a double drum-stick, is anchored at its base to the naked membrane round the mouth, or to the shell by its sarcodic envelope, which, clothing the entire length of the stem, protrudes far beyond its free end, except in the case of Globifera, forming an extensile flexible

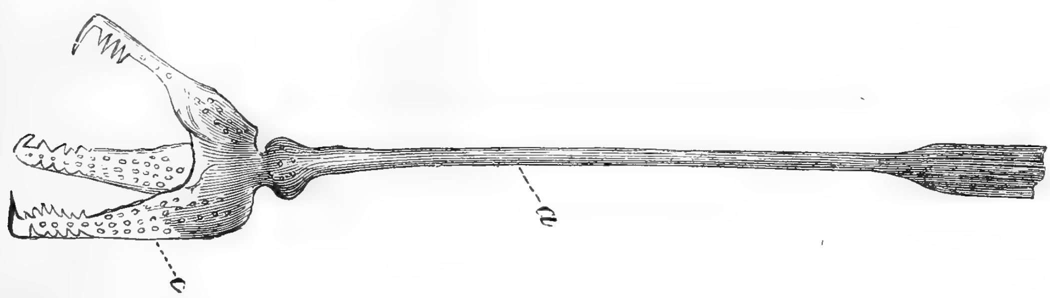

Fig. 83.—*Pedicellaria globifera.*

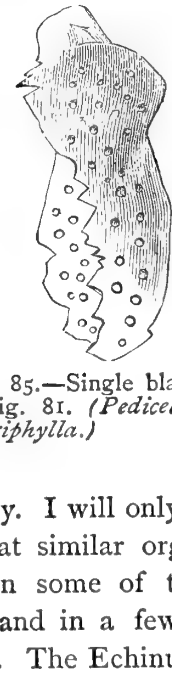

Fig. 85.—Single blade of Fig. 81. (*Pedicellaria triphylla.*)

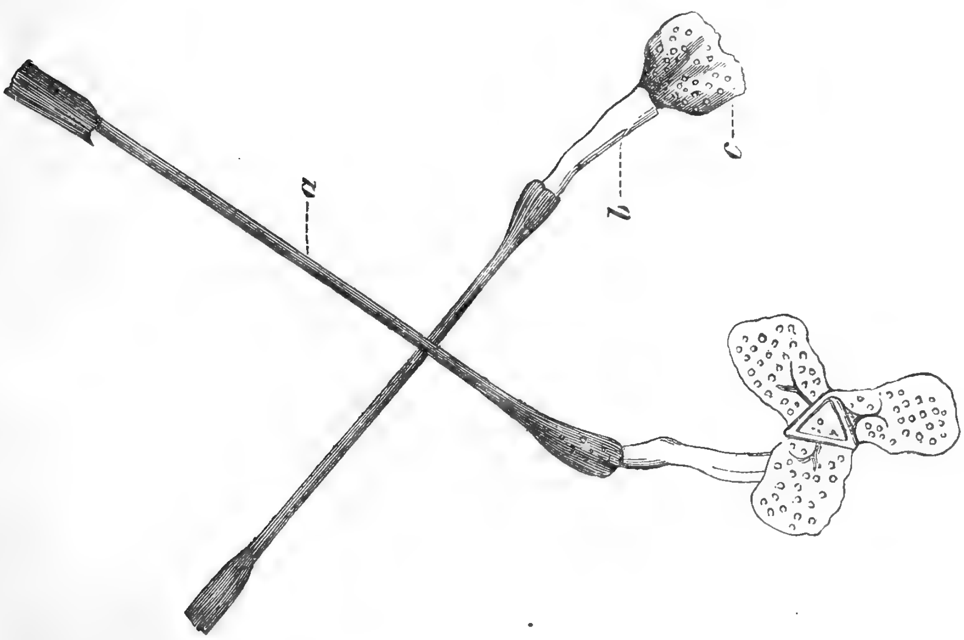

Fig. 84.—*Pedicellaria stereophylla,* open and closed.

neck on the top of which is perched the head, consisting of three beautifully reticulated forceps-like blades or jaws, armed, except in the smallest kind, Stereophylla, with strong sharp serrated teeth. In Globifera the head is placed directly on the stem without any intervening neck. In their natural state these calcareous heads, as well as the stems, are clothed with a sarcodic covering, especially abundant and dilated in Globifera. But when treated with potass this is dissolved, and the skeletons only left.

It is an interesting experiment to cut out with a pair of scissors, which can be easily done, the membranous portion surrounding the mouth of the Echinus, and detaching it from the five prominent teeth protruding through it, and familiarly known by the fanciful name of Aristotle's Lantern, to place it in some sea-water on a glass slip under the microscope. The animal must be undoubtedly dead, but on the severed portion under examination the pedicellariæ will be seen still in a lively condition, bending their extensile necks in every direction, and opening and shutting their three-bladed jaws.

I have now only to add a few words on the possible functions of these pedicellariæ, though nothing is known conclusively on the subject. Their first discoverers considered them to be parasites perfectly independent of their hosts; but this cannot be the case for various reasons, as in the first place they are invariably present in the same numbers and in the same position, which would not be the case were they adventitious; and secondly their skeletons are formed of precisely the same material and on exactly the same structural plan as that of the creature's test on which they rest; whilst the sarcodic envelope surrounding them is a mere continuation of that which clothes the entire shell as well as the spines upon it. Perhaps the best suggestion as to their use is, that they catch and hold in their grasp the small crustaceans swimming past, and that these, dying and decaying, attract around them clouds of minute infusoria, which eventually become the prey of the Echinus; but this is a mere theory which must be taken for what it is worth.

MICROSCOPY.

Cement for Glycerine.—Every one who has had much experience in microscopy recognises the extreme value of glycerine as a mounting medium, but the evil reputation it enjoys for "leaking" has much restricted its use. The cements in common use are not to be relied upon. Dammar varnish, so strongly recommended by some, becomes so saturated and softened that after a few months, cover, specimen and cement may often be wiped off the slide with the greatest ease. Even good gold size is not safe, and I believe chiefly for the reason that many bad specimens of this varnish are in the market. Having experienced much inconvenience from the want of a reliable cement, I am glad to believe that I have at length succeeded in obtaining one. The description is to be found in Dr. Marsh's book on "Section Cutting" (a notice of which you gave recently), and as the information will doubtless be welcome to many besides myself, I send you the following extract, which perhaps you may consider worthy of preservation in your pages. "The great drawback to the use of glycerine is the extreme difficulty experienced in preventing its escape from beneath the covering-glass, for it unfortunately possesses such great penetrating power that no cement hitherto devised can be thoroughly depended upon for withstanding its solvent action for any considerable length of time. Attention to the instructions however presently to be given will however reduce this risk of leakage to a minimum: after clearing away all superfluous glycerine from round the cover, with a very small camel's-hair pencil, charged with solution of gelatine, a ring must be made round the margin of the cover of sufficient breadth to take in both cover and slide. As this cement is perfectly miscible with glycerine, it readily unites with any of that fluid which may ooze from beneath the cover and which in the case of any of the ordinary varnishes would act as a fatal obstacle to perfect adhesion. To make the cement, take ½ oz. of Nelson's opaque gelatine, put it in a small beaker, add sufficient cold water to cover it, and allow the mixture to remain until the gelatine has become thoroughly soaked. The water is now poured off and heat applied until the gelatine becomes fluid, when three drops of creosote should be well stirred in and the fluid mixture transferred to a small bottle to solidify. Before use this compound must be rendered liquid by immersing the bottle containing it in a cup of warm water. When the ring of gelatine has become quite set and dry (which will not take long) every trace of glycerine must be carefully removed from the cover and its neighbourhood by gently swabbing these parts with a large camel's-hair pencil dipped in methylated spirit. After drying the slide, a ring of Bell's microscopical cement may be applied over the gelatine, and when this is dry another coat is to be laid on. If it be desired to give to the slide a neat and tasteful appearance it is a very easy matter by means of the turntable to lay on a final ring of Brunswick black or white zinc cement."—*William Briars, Hackney.*

Microscope Improvements.—In an important paper recently read before the Chichester National History and Microscopical Society, on "Microscopes," Mr. F. J. Freeland reviewed the most noteworthy improvements which have been made in objectives, both at home and abroad, within the last five years. Among other subjects, he said that "a new eighth and a twelfth, designed by Professor Abbe, for use with oil of cedar, and, to obviate screw collar adjust-

ment, for varying thickness of cover glass, upon objects, is very highly spoken of by leading English observers. If this work without counterbalancing objections, a revolution in the future of objectives may be expected. The object must be somewhat specially mounted. Danger that the fluids may intermingle under necessary traversing when a living object in water is examined with a water immersion lens is not lessened by oil substituted, and Mr. Dallinger rejoices that high power English dry lenses, usually, suffice for investigation of minutest living things, from the study of which, as he remarks, so much may be anticipated."

MOUNTING POLYZOA, &c.—Mr. Thomas Lisle, of Wolverhampton, gives in the "Midland Naturalist" for March, the following process for mounting these objects:—"Place the polyzoa in a deep cell with some of the pond water; let them remain undisturbed until they have expanded their tentacles, then suddenly let fall a drop of alcohol into the cell. This kills them instantly. The cell is then filled with distilled water or glycerine, and sealed in the usual way. Rotifers may be treated in the same manner, but the cell may be shallow."

CELLS FOR DRY OBJECTS.—We have received from Mr. H. P. Aylward, of Manchester, some prepared cells, which we believe may be useful to those who mount many dry objects. They are made, either of paper, or cloth rings, well coated with, we believe, a shellac varnish, which becomes hard and glossy, and when the objects are to be mounted the application of heat melts these rings to the slip and fastens on the thin cover. Their use is of course limited to those objects which will bear heat, but most foraminifera and other calcareous organisms and many microscopic fossils can thus be rapidly mounted, for as soon as the slide is cold the varnish becomes quite hard and there is no danger of the object becoming attached to the edge, which sometimes happens when rings are fastened on with gold size or other varnish. The thin glass when it is being attached should not be touched with a cold needle, or condensation takes place under the point; but if this is avoided we have found the glass remains quite clear, and the object is in no way obscured. It would seem as if the attachment is likely to remain permanently hard and firm, but that can only be proved by lengthened experience.

NEW SPECIES OF RHIZOPODS.—In the "American Quarterly Microscopical Journal" for January, Professor W. S. Barnard describes some new kinds of American Rhizopods. As a rule, the American species are of European genera, and it is very seldom a new one is discovered. Our species (*Euglyphia tegulifera*), appears to be a very interesting form, on account of its peculiar shell. It was found among fresh-water algæ near New York. We take advantage of this opportunity to express our high opinion of this well got up and excellently edited journal.

REMOVING AIR-BUBBLES.—Mr. F. C. Clarke, in the "American Naturalist," gives the following method as practised by Dr. Johnson: The apparatus he employs is of very simple construction, being a common dentist's vulcaniser, the means—steam. The preparations to be thus treated, especially those of wood, are prepared in the usual way and made ready for mounting. They are next placed in a small vessel of any material which will resist a certain amount of heat. Dr. Johnson uses a small glass phial in his experiments: this is filled up with water after all the specimens (as many as it can conveniently hold) are placed within. A cork can be used, but a slit must be cut in it to allow the escape of air and the admission of steam and hot water. A little water is now poured into the vulcaniser, the bottle of objects placed within, and the lid of the machine screwed down air-tight. The whole is now heated to a temperature of about 300° Fahr. for a few minutes. This temperature is sufficient for all practical purposes. When sufficiently cooled the phial is removed, the water drained from the bottle, and alcohol substituted. The specimens are now ready for mounting. By this process the specimens are made absolutely free from air, for the steam penetrates and forces out the air from the objects operated upon; and the tissues remain undestroyed.

ZOOLOGY.

PLANORBIS MARGINATUS.—Professor Ralph Tate in his work on "British Mollusks," says, *Planorbis marginatus* is unknown in Scotland. Perhaps it may interest some of the readers of SCIENCE-GOSSIP to know that I have lately taken upwards of a dozen specimens from Duddingston Lock, Edinburgh. Also specimens of *P. carinatus*, *P. Nautileus*, and *P. contortus*, the last-named species is very numerous.—*John Adams.*

THE ECHINUS IN AQUARIA.—Would any of the readers of SCIENCE-GOSSIP inform me of the cause of the absence of the Echinus in our large aquaria? Is it that animals found in deep sea dredging, will not flourish in these, or is it a difficulty as regards supplying it with proper food? I have never succeeded in keeping them in small aquaria for more than a short time; the last brought me on December 7 lived for a month, the spines then began to fall off quickly, and in a day or so it died. The Echinus is such an interesting inhabitant of an aquarium, that I should be very glad to know if it is possible to keep it for any time in captivity.—*M. D.*

THE HOODED OR ROYSTON CROW (*Corvus cornix*).—These noble birds have been numerous in this neighbourhood for some weeks, one or two will occasionally perch on the rails of my garden fence,

they seem less timid at the approach of man than their congeners the rooks.—*J. M., New Brompton, Kent.*

THE COLOUR SENSE IN CATTLE.—The degree in which various species of animals are able to appreciate colour has lately been the subject of discussion. It seems to me that the displeasure shown by cattle at scarlet or blood-red objects is presumptive evidence that they can discriminate between these shades and the dull brownish-red so common in their own species. It might indeed be contended that like certain birds they take offence at colours bordering upon their own. But I have never heard that the dislike of redness is at all confined to red cattle. On the contrary, it is manifested by wild species of the ox tribe, which are never red, and by the wild cattle of Chillingham and Lyme park, which are uniformly white. Does any correspondent of SCIENCE-GOSSIP know an instance of any animal being excited to anger by blue, yellow, or orange objects ?—*J. W. Slater, Aylesbury.*

MISTAKES MADE BY INSTINCT.—It has struck me that it would materially help to advance the new study of comparative psychology, if our correspondents would put on record good and well-authenticated illustrations of the mistakes made by animals. We hear much of their marvellous instincts, but notwithstanding, there is a tendency to magnify their character, and little or nothing is said of the mistakes of instinct, whereby we might learn even more of animal psychology. I refer to such mistakes as that made by the humming-bird hawk-moth, fluttering over the artificial flowers of a lady's bonnet, or a bee which buzzed into the grip of a sea-anemone, as recorded by Jonathan Couch.—*J. E. Taylor.*

HOUSE-FLIES AND THEIR PARASITES.—In reply to the request of the Rev. W. Marston Beeby, concerning the parasite described on page 21 column 1 in SCIENCE-GOSSIP, I can unhesitatingly assure him that it is the well-known fly-parasite called Chelifer, the surname of which used to be Fasciatus; but in a slide I have (prepared by Mr. Cole, see the bottom of the second page of your advertisement wrapper) it is labelled Cancriodes. Mr. C. can, probably, supply the object; but he has added to the label the words "very rare." In truth I have never seen but one in life, and that was, as your correspondent describes, adhering with wonderful tenacity to the leg of a common house-fly, *Musca domestica.* Mr. B. compares the claws of this insect to those of the lobster, but they are still more like those of the scorpion, and, in fact, the common name is scorpion insect; it is a perfect scorpion all but the tail. Its having eight legs shows it to belong to the great family of spiders, and therefore, in strict definition, is not an "insect" at all, as no insect proper has more than six. There is another variety of this kind still more striking and curious, the *Obisium trombidioides*, but which is still more rare and hard to meet with, and is the true lobster insect. I have two slides of it, but have never seen it in life. But to return to the Chelifer, I will transcribe a passage from that very useful and pleasing little work entitled "Objects for the Microscope," by the Rev. L. Lane Clarke (London: Groombridge & Sons: 5 Paternoster Row). "Chelifer; this parasite attacks flies. I have seen a common fly run wildly about the window-pane, shaking itself violently, and apparently in great distress. Upon catching it, I found a small scorpion-like creature fixed upon one of its thighs by a pair of tremendous claws. Hardly could it be detached for examination, and then it ran quickly like a crab, sideways. The Chelifer belongs to the *Trachean Arachnida*; that is, they breathe by means of trachea and spiracles, and not as the higher order of spiders, by lungs, or internal gills. They have eight legs, two long palpi, armed with claws, the eyes are at the side of the thorax, and the flat abdomen is jointed." In conclusion, I would add a few words upon the question whether the Chelifer is a parasite, or merely an occasional foe of the fly? From its extreme rarity I should undoubtingly say the latter; that is to say, if by "parasite" is meant something *bred upon* another animal; just as mites are upon a piece of stale cheese, for example. The reason why the Chelifer, when caught in the house, is usually found on the "window-fly" is because, as every one knows, it is by far the most common domestic insect, as its name of *Musca domestica* clearly indicates: but I have no doubt that the Chelifer would make equally free with the leg of a *Tipula oleracea* (Daddy Long-legs) if it happened to come in his way.—*H. U. J., Exeter.*

DESIGN IN THE NESTS OF BIRDS.—At a recent meeting of the North Staffordshire Field Naturalists' Club Dr. M'Aldowie read an excellent paper on the above subject. He said in no class was the special design for the protection of offspring better seen than in the bird class. The great majority, especially the weak, trusted to concealment, which was effected first by the location of the nest, usually of some inconspicuous material, in bushes, holes, trees, and banks. A second method of concealment was by constructing the nests of material similar in appearance to that which surrounds it. This was adopted by the chaffinch, the common wren, and the martin. Thus the chaffinch would place its nest in the fork of a tree, and construct it so cunningly of mosses and lichens that it had the appearance of an excrescence on the branch. Dr. M'Aldowie had noticed a striking illustration of this method in the cliffs along the coast of Kincardineshire, where the martins built their nests in the granite or gneiss of material exactly similar in appearance. The third form of concealment was in the colour of the eggs being much like the soil on which they are laid. This was seen in the lapwing and skylark. They often choose the side of a small

mound for their nests, to be able the better to watch those who would attack them. Their young were also coloured to resemble the soil, and therefore could not be easily seen by persons standing up. The young, too, seemed to know that their greatest chance of safety was in lying still. The fourth method was that the parent bird was coloured to simulate the surrounding herbage, and would not move from its nest very often until forcibly pushed. The second great form of protection was by situations inaccessible to animals without wings. Those who could drive off intruders singly built solitary nests, such as the birds of prey, the larger gulls, and swans. Others, such as rooks and herons, live in colonies, and, when attacked, unite to repel the enemy. Among small passerine birds adopting this method were sand-martins, but in tropical countries the smaller class used it more extensively. The most remarkable examples were seen in the weaver-birds. Captain Drayson had given an interesting description of the habits of this class in countries infested by monkeys and snakes, which of course could climb trees. The nests were therefore so constructed that these animals could enter only from below, and only by passing along a branch which their weight would cause to dip in water, making both snake and monkey beat a speedy retreat. Although some had said that there was an architectural principle regulating the construction of birds' nests, and though similarity of structure of different groups was adduced in proof of this, Dr. M'Aldowie ventured to assert that there was no such principle involved. The similarity of structure might be explained by the fact that the habits and surroundings of most birds of the same genus are nearly alike, and their enemies almost identical. But many differed remarkably in their nest formation. The swallow family and the martin built nests of mud and clay, the sand-martin tunnelled in gravelly pits, while the swift deposited her eggs in the hole of some old tower. Here there was no architectural type. Neither would such a theory explain the facts that the wren always built its nest of material precisely the same as that which surrounded it, making it, as it were, a part of the material; that the sparrow when it built in trees erected a large-domed edifice, and when depositing its eggs in the walls of houses merely lined the bottom of the cavity with straw and feathers; and that the hawk often laid in the forsaken nests of crows and magpies. Milne-Edwards said "birds' nests which vary with the species are yet, as it were, identical as regards any species, and are uniformly constructed in the way best fitting the young of that species." In the last sentence was the key of the position; it was a law in ornithology, and demanded much attention at the hands of the naturalist. These were Dr. M'Aldowie's views, and they were the outcome of some years of study of nests and eggs in a northern district where birds of almost every class abounded. No scientific authority that he knew of had treated the subject in a systematic manner. That some plan or design regulated the nidification of birds was certain.

SIR JOHN LUBBOCK'S "ANTS."—This indefatigable naturalist has been communicating additional papers on his insect-pets to the Linnean Society. In his two last communications, one of which was devoted to their anatomy, and the other to their habits, he stated that, instead of using water as a means of isolation, fur arranged with the hair points downwards answered the purpose better. He recommended this plan to people who live in hot countries where ants are troublesome. Sir John finds that, contrary to what has been stated, the workers (besides the queen) occasionally lay eggs, and these always produce males. Ants possess domestic servants; a curious blind beetle (Claviger) residing in some communities, though the ants are not all on a level of intelligence sufficient to keep clavigers. Sir John said he had two queens of *Formica fusca* five years old, and in good health, and also workers of different species, some four years in his possession. Though previously he has shown instances of ants using their friends badly, yet to their credit it may be said that ants of the same nest never quarrel or are ill-tempered among themselves. An instance was given of an ant without antennæ losing her way, and being attacked by an enemy, and afterwards tenderly relieved by a good Samaritan. From the experiments recorded, it would seem that ants recognise fellows of the same nest, but where, as in some cases, there are one hundred thousand individuals, it appears incredible that they should recognise each other at sight; nor is it likely that peculiarities pertain to those of each nest. Have they signs or pass words? Sir John Lubbock has endeavoured to throw light on this subject by experimenting on the pupæ. Although certain species of ants are deadly enemies, yet their larvæ if transferred to one another's nests, will be taken care of as if their own. In ant warfare, sex is no protection; but the young are spared. Now, if recognition were effected by signal or password, the larvæ or pupæ would not be intelligent enough to appreciate and remember this, and afterwards in being returned to the former nest, when full grown would carry the signal of the wrong nest to their detriment. The results of several experiments on *Formica fusca* and *Lasius niger* were, among others, that thirty-two ants transferred from their nests as pupæ, and again when older returned to their own nests, were all amiably received, from which Sir John infers that they have no pass words.

THE LATE MR. FREDERICK SMITH, F.L.S.—Entomologists throughout the world will hear with regret of the death of this celebrated naturalist. He was one of the assistant-keepers of the zoological department of the British Museum, and our great authority on matters appertaining to the Hymenoptera.

WHITE'S THRUSH.—Mr. Harting states in the "Zoologist," that a specimen of this rare bird was shot in September, 1878, at Hardacres in Berwickshire. Another specimen was seen in the same neighbourhood in January last.

NEW SPECIES OF CHAMELEONS.—At a recent meeting of the Zoological Society of London, a communication was read from Dr. A. Günther, F.R.S., containing a description of four new species of chameleons from Madagascar, proposed to be called *Ch. malphe*, *Ch. brevicornis*, *Ch. gularis* and *Ch. globifer*.

MOUNTING AND PRESERVING LARVÆ.—I was pleased with Mr. Brewster's method of expelling the internal tissues of caterpillars, and it may be interesting to know that the best lepidopterists in this part inflate their grubs with melted paraffin wax. This is coloured to suit the colour of the larvæ in hand, and injected with a fine male syringe. There may be some drawback in this plan, but it is, perhaps, the best remedy against change of colour.—*G. Robson, Leicester.*

MIMICRY IN BUTTERFLIES.—A paper has just been read at the Entomological Society, by Dr. F. Müller, recording a remarkable case of mimicry in the Brazilian butterfly, *Eucides pavana*, which mimics another insect called *Acraea thalia*. It is however, in the male sex of *E. pavana*, that the greatest resemblance to the Acraea is found.

TESTACELLA MAUGEI IN JERSEY.—In SCIENCE-GOSSIP for July last, there appeared a short notice from me, announcing the occurrence of what was supposed to be *Testacella haliotoidea* in this island. Since that time I have found two more specimens. Having sent one of them to John Gwyn Jeffreys, Esq., the author of "British Conchology," that gentleman informs me that the species is unquestionably *Testacella Maugei*, not *Testacella haliotoidea*. I feel it right to make this correction.—*Martin M. Bull.*

THE STINGS OF BEES.—Professor Church describes in "Nature" some experiments made sixteen years ago with the poison from wasps' stings, when he found to his astonishment that it was invariably alkaline instead of acid. A living wasp, duly held in the cavity of a perforated cork, was easily induced to sting a piece of turmeric paper; when a brown-red spot immediately appeared.

"THE PLAGUE AS IT CONCERNS ENGLAND."—We advise all our readers who are interested in this momentous question to procure this well got up pamphlet, published by Hardwicke & Bogue, at one shilling. It gives an historical account of the plague, and the methods to be adopted to prevent its spread, and has been compiled from official and other sources.

BOTANY.

PYROLA, THE WINTER GREEN.—During July last I accidentally came across a small bed of the above plant near Canterbury. I showed it to several botanists, but had a difficulty in finding the name. I thought it would interest some of your readers to know it grows in Kent, and I shall be pleased to furnish any one with specimens in the coming spring who desires it.—*G. Parry, St. Paul's, Canterbury.*

TERATOLOGICAL NOTES.—The curious form in the flower of a calceolaria figured on page 41 is not uncommon, though I do not remember noticing it in the small-flowered shrubby varieties. A similar

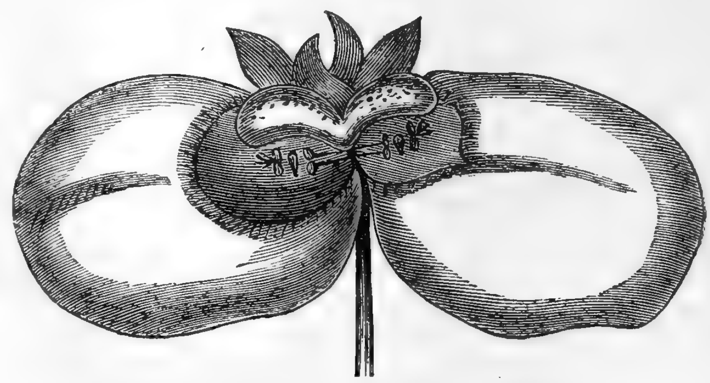

Fig. 86.—Malformation of flowers of Calceolaria.

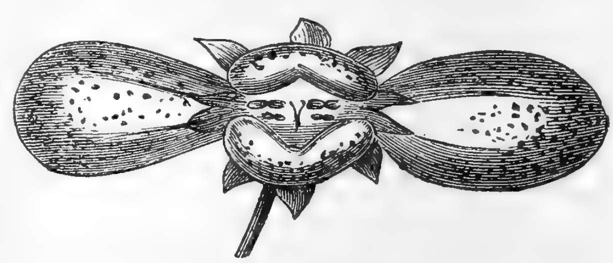

Fig. 87.—Malformation of lips of ditto.

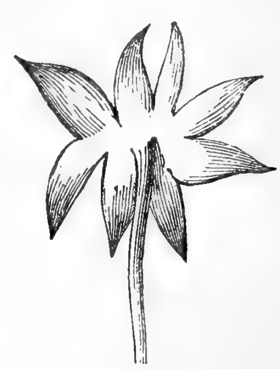

Fig. 88.—Calyx seen from behind.

flower is figured in Masters' "Vegetable Teratology," page 230, where it is described as an instance of perfect Peloria, resembling that often found in various species of Linaria, &c. The herbaceous, greenhouse calceolarias are very subject to irregular development of different kinds, and in a collection of two or three dozen a large number of curious and interesting malformations may be found. I inclose rough sketches of two flowers which I found with various other abnormal specimens last year. It will be seen that in each case two flowers have apparently coalesced, though in different manners. In fig. 86 the two flowers are nearly of normal size and form, but the two upper lips are united. In fig. 87 the lower lips are only about half the normal size, the lower pair of stamens are abortive and there is only one pistil.—*F. T. Warner, Winchester.*

GEOLOGY.

THE ROYAL DUBLIN SOCIETY.—We are much pleased to note that Mr. G. H. Kinahan, M.R.I.A., the author of the "Geology of Ireland," which we had recently the opportunity of reviewing in our pages, has been elected president of this society.

PEBBLES WITH UPPER-LUDLOW FOSSILS IN THE LOWER CARBONIFEROUS CONGLOMERATES OF NORTH WALES.—At a recent meeting of the Geological Society, a very interesting paper on the above subject was read by Aubrey Strahan, and Alfred O. Walker. The authors described the mode of occurrence near Abergele of certain lower carboniferous conglomerates, best exposed in Ffernant Dingle, and especially of one containing numerous red and green sandstone pebbles, which enclose fossils of Upper Ludlow forms, and lying above the so-called "Bastard Limestone." From the arrangement of the beds the authors believe that they may have been deposited against a bank or sloping surface of Wenlock shale; and they state that the great majority of the pebbles in the conglomerate are quite unlike any rock known in the district, but closely resemble the Upper Ludlow beds of Kendal and Central Wales. The authors discuss the origin of the pebbles, and suggest "the probable extension of the Ludlow beds under Lancashire as the most likely source from which they can have been derived."

PRESERVING FOSSILS.—Prof. W. Boyd-Dawkins in an appendix to his "Cave Hunting" gives the following directions for the preservation of remains from caves: "The fossil bones and teeth, which have very generally lost their gelatine and have a tendency to crumble and split to pieces in drying, should be gradually dried, and from time to time saturated with a weak hot solution of gelatine or glue. Silicate of soda, sometimes called "liquid glass," or melted paraffin (not the oil), may also be used for the same purpose. If the bones are extremely soft, they may be rescued from destruction by letting them dry in the matrix, saturating them and the matrix with a solution of gelatine, and then clearing off the latter." —*C. R. L.*

PRESERVING FOSSILS.—I always use a solution made by the Indestructible Paint Co., 27 Cannon Street, E.C. Some years ago it effectually waterproofed (so to speak) some Portland stone columns to which I applied it, making their surface as hard as flint. Hence I have used it on fossils and find that it renders even chalk perfectly hard. I recently saturated some impressions of sponges, which we all know will hardly bear touching, and find that now they might almost be brushed without injury. It is hardly necessary to add that the solution is perfectly colourless, and that it leaves not the slightest perceptible deposit. The cost is very trifling, and as the company made me for this express purpose a pint of solution for two or three shillings, I have no doubt your correspondent could get what he wanted. He will not be disappointed.—*F. H.*

METHODS OF PRESERVING FOSSILS.—In SCIENCE-GOSSIP for February, a correspondent W. G., asks for information as to the best method of preserving mammalian bones and other fossils, saying that he had been advised to paint them over with a hot solution of gelatine, but had not found the result very satisfactory. In the March number, Mr. J. W. Carr recommends that they should be painted with thin gum. Mr. Carr may have succeeded with this to a certain extent, if by *painting* he really means *soaking*, for I suspect that the reason why W. G. did not succeed with the gelatine may have been that he did not soak the fossils sufficiently; if the bones were at all large and were merely painted over with a thin solution of gelatine, they certainly would not become very much harder by such a process. For the bones of the larger mammalia glue is the best material; it should be prepared in a vessel which is large enough to admit the specimen, which should be lowered into it on a sieve or a piece of perforated wire, and allowed to remain in the solution for a few minutes, till it has imbibed a sufficient amount of glue to replace the lost animal matter, it may then be carefully taken out and left to dry. If the bone is a perfect one, with epiphyses, &c., the operation may have to be repeated, and it is a good plan to remove a small portion of the surface bone so as to admit the solution freely into the interior; when the specimen is taken out, the fragment of bone can be carefully replaced. For all the smaller bones and for mollusca extracted from sands or loams, gelatine is preferable; like the glue it should be used while hot and in the manner above described; or it may be ladled over the fossil if it is very delicate and tender. A thin solution of gum-arabic or gum tragacanth is useful for painting over the surface of fossils from the lias or coal measures to prevent their scaling or chipping. As regards chalk fossils my experience is that those from inland localities seldom need any preservative process, but that those collected from sea cliffs, being saturated with salt water, generally effloresce and split up, unless they have been well soaked in fresh water. As soon as they are brought home they should be put in a basin of fresh water and left there for a day or two; then they may be taken out, trimmed and cleaned, and replaced in clean fresh water, where they should remain for three or four weeks, the water being changed at least once every week. I have always found this plan effectual. In the "Geological Magazine," vol. ii. p. 239, your readers will find a short article by Mr. Davies, of the British Museum, in which instructions for preserving mammalian remains are given. Some hints on trimming, cleaning, and preserving fossils will be given in the new edition of Penning's "Field Geology," now in the press.—*A. J. Jukes Browne, Highgate.*

NOTES AND QUERIES.

SQUIRREL.—A few weeks ago, I saw, what at first I was inclined to call a black squirrel, more correctly I should say the colour was a very dark sable, it had the usual white breast; I have heard of a so-called "yellow squirrel," but never one of this colour. I had a good view of the animal, which crossed the road about thirty yards in front of me.—*W. G. Tuxford.*

TENACITY OF LIFE IN THE WASP.—Being engaged in a drawing office connected with the Great Western Railway in 1841, we were very much pestered by wasps, attracted by some lime-trees then in blossom outside, to the extent that one hundred were killed during a single day. One of these individuals I dispatched while crawling over my board, by dividing the abdomen from the thorax with my pen-knife. Seeing him buzzing about very actively, and trying to fly, but unable to do so, being out of balance, it occurred to me to make him a paper tail; the first I made about the length of his own was not heavy enough, being of very thin paper, so I made one three-quarters of an inch long, in shape like that of the large Red Ichneumon fly. This I attached to the thorax, for want of better cement, with a piece of prepared ox-gall; immediately he took wing and flew about the room, apparently greatly to the terror and annoyance of the other wasp, who attacked him fiercely, apparently both by wing and sting, the latter of course of no effect on his paper appendage. He flew about for over two hours, when I lost him, and therefore cannot tell you how long he continued active; he probably flew out at the open window.—*F. L., Rotherham.*

YEW-TREES IN CHURCHYARDS.—Your correspondent, E. Straker, makes inquiry for any traditions or reasons why yew-trees were planted in churchyards. A learned antiquarian once provided me with information as follows: "An act of parliament passed in the reign of an early English monarch, made the planting of a yew-tree in every parish churchyard compulsory. Cross bows were made of this material; yew wood became scarce, and the God's acre seemed a suitable spot for the cultivation of such a necessary material for the warlike requirements of that period."—*H. P. Stock, Barnet.*

YEW-TREES IN CHURCHYARDS.—In the churchyards of Northamptonshire and neighbouring counties fine old yew-trees may still occasionally be found, and invariably, as far as my experience goes, on the south side of the church. I have noticed that where this occurs the most used entrance to the church is also on the south, the north door in most country churches having been blocked up to keep out the cold. The trees being ornamental as well as useful were probably planted where they would be most seen. For the same reason the south-side was chosen for burials, so that the congregation, coming to and leaving their parish church, might see the graves, and be reminded to pray for souls of departed friends.—*W. H. Jones.*

YEW-TREES IN CHURCHYARDS.—It may interest E. Straker to learn that Sir Thomas Brown, in his "Urn Burial," thinks it possible that the planting of yews in churchyards arose from ancient funeral rites, or as an emblem of the resurrection, from its perpetual verdure. The yew-tree was an emblem of mourning with the Egyptians, Greeks, and Romans, from whom it was adopted in turn by the Britons. It appears also to have been an ancient custom to place them singly. Statius in his "Thebaid" calls it "the solitary yew;" and it was at one time as common in the churchyards of Italy as it is now in North and South Wales. I have heard that in many Welsh villages the yew-tree and the church are exactly the same age, the one being planted when the other was built. Another supposition is that yews were planted to protect the church from storms. In statute 35 of Edward I. it is stated that trees were often planted to defend the church from high winds, and the clergy were requested to cut them down for the repairs of the chancel of the church whenever required. A great deal has been said about yew-trees being planted to supply bows, but is there really any record of this?—*G. O. Howell, Shooters' Hill.*

INTELLIGENCE IN MAN AND ANIMALS.—Man judges according to his capacity of the actions of his fellow-men, by inferences drawn from a knowledge of his own nature. The truth of this may be seen in the case of a man born blind, who cannot possibly be made to understand what the sense of sight is. In judging of the actions of the lower animals, whose nature obviously differs from his own, he has not the same means of comparison, and is liable to err, if in actions which resemble his own, he rashly assumes they are the result of reason. Those who credit the lower animals with reason, if they are consistent, will also credit them with conscience. This Mr. Darwin does (see "Descent of Man," part i., chap. iii., p. 78). "I agree with Agassiz, that dogs possess something very like a conscience." In the same work Mr. Darwin draws the usual distinction between instinct and reason, and at p. 38, part i. says, "We may easily underrate the mental powers of the higher animals, and especially of man, when we compare their actions founded on the memory of past events, on foresight, reason, and imagination, with exactly similar actions performed by the lower animals; in the latter case the capacity of performing such actions having been gained, step by step through the variability of the mental organs and natural selection without any conscious intelligence on the part of the animal during each successive generation." Leave out the words higher animal, and the observation is the same in effect as that in my letter of January 1. The whole gist of Mr. Darwin's work, however, is to prove that the intelligence of quadrupeds differs from that of man only in degree. The point of agreement which exists owing to their possession of the same senses as man, are strongly insisted on, the points of difference much less so. Mr. Darwin thinks (see "Origin of Species") that the love of man may have become instinctive in the dog, which seems highly probable, and explains many of the actions in which observers think they have discovered a guiding power of reason. In the concluding chapter of the "Descent of Man," Mr. Darwin describes the natural feeling of abhorrence with which he first saw the savage of Tierra del Fuego, and compares them unfavourably with a monkey. Low as these savages may be in the human scale they have learned to barter (see Mrs. Brassey's "Voyage of the 'Sunbeam,'") and may yet prove capable of systematic fraud. Take from man his reasoning power, latent though it may be in many cases, yet underlying all his conceptions, and we find the idiot who would perish but for extraneous aid. Take from the quadruped the modicum of reason, which Mr. Darwin and others of his school attribute to it, and we have an animal endowed with the same kind of intelligence we do not understand, but name instinct. In conclusion, I would point out to Mr. P. Q. Keegan, that the metaphysical dispute respecting the "precise nature or manner of the reasoning powers," which he concisely epitomises does not affect the question:

Does the intelligence of animals differ from that of man not only in degree but in kind? which may be affirmed or negatived whichever school of metaphysics the writer belongs to.—*H. Barclay.*

INTELLIGENCE IN MAN AND ANIMALS.—With respect to this subject, a remarkable instance is mentioned in "Nature," February 20. Some rats gnawed through leaden pipes to obtain water. Dr. Darwin explained by saying that rats heard the water trickling, and reasoned about it. They cut through the pipe to obtain it. I think this explanation probable. I agree with your correspondent, Mr. Rogers, who contends that memory is an act of reasoning. Dr. Darwin had a dog which recognised him after several years' absence. This is mentioned in his "Descent of Man," chap. ii., I believe, but I quote from memory. This dog must have exercised some reasoning power in recognising Dr. Darwin. With respect to reason being developed instinct, as Mr. Keegan says, Huber thinks that in the lower animals there are glimpses of reason, not merely instinct. Darwin says that instinct is variable, and it might vary so far as to produce some reasoning faculty. With respect to man's reason, some Evolutionists argue that it may not have been merely developed, but that some supernatural change may have taken place. Henslow in his "Evolution and Religion," writes to this effect: Certainly the gap between the apes and man, in respect to cranial capacity is very great, and not easily bridged over. Lopinard (L'Anthropologie) gives 1500 cubic centimètres, as cranial capacity of man; 531 for gorilla. Making allowance for size of body, the ratio of brains of chimpanzee and man is given as 38 to 100. The fact of monkeys chattering, apparently consulting, and then simultaneously acting, is not, I think, explainable merely by instinct. The reasoning might not be very acute, but that would not be necessary. Of course much depends on the way the facts are looked at. Those favouring the view of animal reasoning, would naturally find arguments where their opponents would question the reasoning power. Our natural habit of regarding ourselves as the most perfect beings, also militates against the view of animals having reason, as we are naturally loth to allow that they are of similar nature to ourselves. But on the whole, I think that animals have a somewhat higher faculty than mere instinct, and therefore some reasoning power.—*A. Wheatley.*

INTELLIGENCE IN MAN AND ANIMALS.—As a small contribution to the consideration of the above-named subject, permit me to refer to a fact which I recorded in a paper that appeared in SCIENCE-GOSSIP for November 1, 1876, entitled "Spiders and their Webs." The particular spider there mentioned, after being bitten by a smaller spider of another species, plucked the poisoned limb out of the socket, and cast it from it, evidently, to save its life. Now, was this conduct prompted by what we call reason, or by what we call instinct? Further, what is reason and what is instinct, more than names under which we cloak mysteries, that we are all very far from comprehending? The voluntary act of this spider in amputating its own poisoned limb, could scarcely be attributed to "memory," or "experience," and it suggests some deep reflections. Was it conscious, for instance, that death would ensue, unless the poisoned limb were immediately plucked out and cast away? and, if so, does this show a knowledge of physical right and wrong? Again, was this small creature acquainted with Harvey's great discovery, "the circulation of the blood," and did it know that an injected poison could be absorbed into the circulation to the destruction of life? Further, did it know that in its case, Nature (or, for anything we know, itself) could reproduce the amputated limb? And, lastly, who had been sent to its peculiar mental world, to preach the Divine precept, "If thy right hand offend thee, cut it off, and cast it from thee?" Man is too apt to arrogate to himself a peculiar or special niche in the great temple of nature, and to rely, too confidently, upon his own very finite powers of observation. Before the telescope was invented, the infinitude of the stellar system was, "the sun and moon and eleven stars;" before the microscope was invented, a drop of water was a drop of water, and nothing more; and should it ever be practicable to make telescopes or microscopes that could increase our mental vision as greatly as these instruments have increased our physical vision, then we might be in a better position to pierce the depth of the mystery that attaches to the reasoning powers of the lower animals. It is generally asserted that, so far, "man is the greatest outcome of creative power;" but as we have only man's word for this, there may be more self-conceit than infinite truth in the assertion. The larvæ of the blow-fly, when it is devouring the flesh of a living animal, may conclude that they are the greatest outcome of creative power, because they are unable to comprehend any higher outcome of this power; but we know this would be a mistaken conclusion on their part; and for anything we know, the earth, planets, sun and stars, may all be living, and intelligent, outcomes of creative power, as much superior to man, as man is to the blow-fly. And as regards reason, why may it not be the universal concomitant of all created being? Scientifically as well as poetically, we may conclude, that the Creator will be reflected in all His works; and if so, His attributes may be expected to be reflected by all His creatures to the finite extent of the reflecting capacity which has severally been bestowed upon them. Man, consequently, may be in error, when he assumes that he, alone, is the possessor of reasoning powers.—*C. L. W.*

INTELLIGENCE IN MAN AND ANIMALS.—I have read with pleasure the notes of your correspondents on this interesting subject, and, although it has been ably dealt with by Messrs. Keegan and Barclay, I hope still to see a little more light thrown on the matter, and a more intelligible distinction shown between instinct and reason. Mr. Rogers, in your February number, says: "A little personal observation and reflection, would, I should have thought, suggest to your correspondent, &c., that what is called *instinct* in animals often passes under the name of *reason* in man." Now "personal observation and reflection" has convinced me, whether I am right or wrong, that anything done by instinct is done without reason, although the instinct which prompted the action might have been, as Pope says, an "unerring guide." The words instinct and reason to me convey a very wide and different meaning. Animals, I believe, act by instinct, and man has had the higher power of reason given him upon which to act, and the only quality in man which I can compare to instinct is impulse. That acting by instinct and acting by reason are from two different causes, I think there is ample evidence, although the action may be the same.

Pope says:

> "Reason raise o'er instinct as you can
> In this 'tis God directs, in that 'tis man"

Mrs. Hale says:

> "The meaner creatures never feel control,
> By glowing instinct guided to the goal."

With regard to Mr. Rogers's remark that the "difference which exists is chiefly one of development," I do not agree. I cannot comprehend "developing instinct," and the sentence seems contradictory in itself. The same question arose at a Debating Society, to which I belong, on a discussion "Is conscience a true guide?" when the apparent consciousness of wrong-doing in dogs was argued in support of the affirmative. Mr. Keegan has, I think, explained this, and the fact of dogs being endowed with sufficient instinct to know that which gives them pain, is not sufficient to convince me that the knowledge is the result of reasoning.—*Idea.*

INTELLIGENCE IN MAN AND ANIMALS.—The following anecdote which came under my own observation some years ago is a curious instance of memory and reasoning in a cow, and can hardly be relegated to mere instinct. My father had sold a cow, which we had reared, to a neighbouring farmer, who kept her three years and then sold her to a miller four miles farther from our homestead. She was with the miller three years, having been absent from us six years, and never in the interim having visited the spot; but she had not forgotten its comforts, especially the scalded mashes of bran and pollard mixed with home-brewed ale that were provided for her at the birth of her calves. One winter day (January 12) when she was about to calve, her master had to leave home, and put her in charge of his man, who forgot her. At night she was looked for in vain. She had at last found her opportunity and escaped to flee to her old beloved home, and actually reached our orchard fence, when she could get no farther, and there her calf was born, and she had the satisfaction after all her trials of being nursed in her old cow-house.—*S. Martin.*

POSITION OF THE MOUTH IN SHARKS.—The peculiar position of the mouth in the sharks and some of their allies, used to be a frequent theme of comment among naturalists of the old school. It was pointed out as nothing less than a special arrangement to enable a destined victim to escape, while the shark was turning on one side to bite. In other words it was plainly seen to be a structural feature disadvantageous to the species in which it occurs. Singularly enough, I have seen no reference to this anomaly in any work, either advocating or combating the Darwinian hypothesis. It seems to me very difficult, if not incapable of explanation on the view of natural selection. If the position of the mouth which prevails in most fishes be the original one, it would seem that any variation from such position must be disadvantageous to the individual, and would militate powerfully against its survival. Or if, on the other hand, the original position of the fish-mouth was that which it now occupies in sharks, I fail to see why any variation which tended to bring it forwards, should not have easily and completely superseded the primitive type among sharks, &c., as well as among other fishes.—*C. R. Slater.*

EGYPTIAN GOOSE.—"The Shepton Mallet Journal" announces that Mr. Padfield, of Pecking Mills, Evercreech, shot an Egyptian wild goose of beautiful plumage, and weighing about 4½ lb., near his mill-pond, on February 27. There were two in company; the other succeeded in making its escape, although wounded.—*W. Macmillan, Castle Cary, Somerset.*

QUERY AS TO FLOWER.—Can any of your readers, kindly inform me, what flower Shakspeare refers to in the closing stanzas of "Venus and Adonis"? where he says—

> "A purple flower sprung up, chequer'd with white,"

and ends his reference thus:

> "There shall not be one minute in an hour,
> Wherein I will not kiss my sweet love's flower."

J. W. Wheldon, Jun.

THE CUCKOO'S EGGS.—Having read in a previous number some questions and remarks on the cuckoo and its eggs, I thought I would give my experience of that bird. I have frequently found the eggs and young, but never in a nest built on the ground, in which some say they are most often found. In some works on ornithology it is said that eggs are frequently laid in wrens' nests; but surely that is a mistake, as the young cuckoo would certainly be too large for such a home. Those I have found were generally either in robins' or hedge-sparrows' nests, and once I found an egg in a half-built chaffinch's. On no occasion have I found nor heard of more than one egg in the chosen nest. How strange it is, that the maternal instinct of birds should be unable to distinguish between their own nestlings and the awkward and big young of the cuckoo! Some time ago I found the young of the latter bird in a robin's nest, and as I wished, if possible, to keep it, I put it in a large cage out-of-doors. It refused all nourishment, and struggled fiercely when food was forced on it. One day I was sitting a short distance from the cage, when I saw a robin fly right up to the bars, and give some food to the cuckoo, which received its, presumably, foster-mother, with a deal of fluttering and apparent joy. For several days two robins fed him regularly, but after a time they discontinued their visits, and in spite of all my efforts the bird died. It seems very curious that the robin-parent should have found out and fed the cuckoo for so long a time, especially as the bird was brought from a long distance to my home.—*Junior.*

ON THE DEVELOPMENT OF THE HOUSE-FLY AND ITS PARASITE.—If Mr. Holmes will again glance over this paper, he will see that I had not the subject of the sketches under observation at all, but that these "were made by Mr. G. Harkus from the microscope, with the aid of a Beale's reflector," and that the size of the egg as given by him is there stated to be $\frac{1}{30}$ inch in diameter, while that of the maggot on emergence was $\frac{1}{25}$ inch. The discrepancy noted may have arisen from the reduction of the original drawings in engraving. It appeared to me that while the egg and larva shown by Mr. Harkus were identical with those matured in my experiment, the chrysalis and fly were, as I stated, "undersized and impoverished;" this I attributed to want of sufficient nourishment while in the larval stage, the extraordinary part of this matter being the wonderful rapidity of the insect's metamorphosis. I cannot agree with Mr. Holmes "that *Musca domestica* never lays its eggs on meat," much stranger places of deposition have been noted, amongst snuff, for instance, the ammoniacal odour being the probable inducement; while, on the other hand, according to Cuvier, *Musca vomitoria* sometimes selects a plant for the purpose, "deceived by the cadaverous odour arising from *Arum Dracunculus* when in flower, it also leaves its eggs there." If Mr. Harkus can recover the subject from which the sketches were made, and which he thinks is preserved, I will pass it through for the editor's determination.—*M. H. Robson.*

VENTRILOQUISM IN BIRDS.—In a former SCIENCE-GOSSIP of last year is a paper about "Ventriloquism in Birds" which solicited the experience of the same. While paying a visit to a station in Westland or Kakitika (Middle Island, New Zealand), in 1876, while walking in the bush I heard a very sharp clear note, and my host informed me it was the "ventriloquist bird," of which I had often heard, and asked me to look for it. I did so, but wherever I went the voice seemed to be at one side or behind me, till by chance I disturbed the bird, when it flew off before I could see it plainly. From what I could gather it resembles much in appearance the English blackbird; is often heard and seldom seen, owing to its natural shyness and peculiar habit of disguising its voice. This was in the centre of the Southern Alps, just below the line of perpetual snow, and during the autumn of our year.—*W. E. Barker, Jesus College, Cambridge.*

THE MOA.—On page 40 of No. 170 SCIENCE-GOSSIP, February 1, 1879 is an article "The Moa not yet Extinct (?)" The bird is said to have been seen in the "province of Nelson, near lake Rotorua and Cannibal Gorges," the latter I have not heard of nor can I find them on the map. The only lake of that name is in the province of Auckland (North Island) latitude 38°10′ south, longitude 176°17′ east. I fancy it must be a hoax, as nearly every year false reports are spread of them having been seen, very often turning out to be tame emus, escaped into the bush. Also, as yet very few bones, only two or three I believe, have ever been found in the North Island, while in the Middle Island we plough them up wherever new ground is broken up. The only lakes in Nelson (Middle Island) are lakes Pakerua, Brunnern, Hochstetter, and Hawick. So I think there must be some mistake.—*W. E. Barker, Jesus College, Cambridge.*

CATERPILLARS AND ONION-CROPS.—For several years past the onion-crops in this neighbourhood have suffered severely from the ravages of the caterpillars and some insect. Can any of your readers suggest a remedy?—*P., Haslemere.*

LONDON UNIVERSITY, FIRST B.A. PASS EXAMINATION.—Can any of the readers of SCIENCE-GOSSIP inform me what are the best works to read on the following subjects as required in the above examination—algebra, geometry plane and solid, trigonometry, mensuration, and co-ordinate geometry? The information would doubtless be useful to many, as the difficulty in selecting from so many works as exist on these subjects is considerable.—*W. J. B.*

THE COLOURS OF TWIGS, BRANCHES, &c.—Trees appear purplish-red during the winter, because the greater number have brown, grey, or purple twigs, and the scales covering the leaf-buds are usually of the same, or some brighter and warmer colour. I believe that this will be found to be the case with our principal trees, the oak, birch, elm, beech, alder, and willow. The oak-twigs are occasionally grey, but generally the same colour as the buds, which, as far as I know, are always brown. The ash has grey stems and black buds. The smaller trees and shrubs are often very richly coloured; the cornel justifies its specific name by its blood coloured twigs; the members of the Rosaceæ are red, orange, and purple, in thorn, bud, and leaf, with much grey on the bark of some species, as the dog-rose and black-thorn. In speaking of leaves, I refer to the blackberry, which retains its foliage in many places till the spring, but the leaves are nearly always bronzed-like veterans. The stems of the blackberry are also very purple in hue. The various willows bear purple branches, and often very brilliantly tinted buds. The colours enumerated are not of course perfectly pure; they are shades of every degree, from orange or crimson in the willow-buds just noticed, to dull brown or purplish grey. The reason for mentioning so many instances is to prove that the local colour of the masses of branchlets is purple or brown, and to show that the colours of the various twigs, buds, and thorns are such as would produce a purplish-red or russet effect when massed together, and crossed in every direction as they always are. It was the practice, we know, of many great colonists, to get a tint by "hatching and driving together loosely," a number of different harmonies, which give, by that means, a colour which could not have been formed so well in any other way. This is the method of Nature. The variously tinted branchlets, their light and shade, with the bluish haze of the atmosphere, combined, will account, in my opinion, for the hue of trees and shrubs during the winter months.—*M. Snape.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

W. MARTIN.—Get Stark's "British Mosses," with coloured plates, published by Routledge & Co., at 7*s.* 6*d.*

W. A. WATTS (Manchester).—Your fossils are the univalve, *Limnea longiscata*, from Eocene strata; the bivalve, a Brachiopod, *Producta striata*, Carb. Limestone.

C. MCINTOSH — Inquires the best method of mounting butterflies' eggs for the microscope. Perhaps some of our readers will answer him.

B. B. SCOTT.—See article on "How to Prepare Skeleton Leaves," in vol. of SCIENCE-GOSSIP for 1872.

W. H. LITTLETON (Bristol).—The best and cheapest book on British Coleoptera, is Rye's "British Beetles" (coloured illustrations), published by Routledge, at 10*s.* 6*d.*

W. H. NEWBERRY.—It is not at all uncommon to see specimens of peacocks, tortoise-shell, and one or two other species of butterfly, which lie up or hybernate during the winter, coming forth on warm days in February and March, having been stimulated into activity by the warmth.

T. WORKMAN.—Ask for the British Museum Catalogues of the insects you mention.

GEORGE TURVILL.—Are you quite sure the "gigantic fleas" on the mole are not ticks (Ixodes)?

T. W. DEALY.—Press of matter has hitherto prevented the publication of your paper, which is in hand.

W. S. (Edinburgh).—You will find full and ample instructions how to proceed in staining vegetable tissues, in the late Dr. Beatty's admirable articles on "Decolouring and Staining Vegetable Tissues" in SCIENCE-GOSSIP, vol. for 1875.

B. HOBSON.—The "London Catalogue" is merely a well-verified list of indigenous British plants. You will find specific descriptions of all our British plants in Hayward's "Botanist's Pocket Book;" published by Bell & Daldy, at 4*s.* This latter is the best book of the kind we know of.

H. CROWTHER.—The specimen labelled "greensand," undoubtedly belongs to that formation. We are not so sure of the numerous small specimens queried "gault," in the absence of characteristic fossils, although they strongly resemble "gault," still we have seen clays of other formations much like them. The red specimen labelled W. looks like altered gault, and very likely it is so, as we found remains of a small decapod crustacean in it. The reddish-coloured sandstone belongs to the lower greensand as the fragment of fossil *pecten* it contains sufficiently shows.

JAMES LOWTHER.—We dare say you will be able to get a good specimen of living Plumatella or Fredericella from Mr. Thomas Bolton, naturalists' studio, 17 Ann Street, Birmingham. He regularly supplies naturalists all over Europe every week with living organisms.

G. R. B. (Shoreham).—The "seed-like objects adhering to orange-peel," are the pupa cases of *Ceratites citriperda.* Slack's "Pond Life" could very likely be obtained from W. Wesley, the natural history bookseller, 28 Essex Street, Strand.

W. H. J. (Uppingham).—The articles named will probably be continued during the summer months. Names of the species inclosed were as follows:—*a. Scirpus carinatus* (Sm.); by Hooker made a subspecies of *S. lacustris;* we believe it to be distinct. *c. Panicum Crus-galli* (Linn.) *d.* We think this is a melilot, one not seen before, but will tell you next month. *e. Setaria viridis* (Beauv.) *f. Ononis arvensis,* (Linn.) *g. Eleocharis uniglumis* (Link). *h. Glyceria aquatica* (Sm.) *b.* A pretty viviparous form of *Cynosurus cristatus* (L.); a valuable specimen. *Note.*—Your observation, amongst botanical notes. We wish all our correspondents would send us good specimens; yours are excellent.

W. K. (Leeds).—The seeds you so kindly send are niger seeds, so called in commerce; but they are obtained from *Guizotia oleifera,* cultivated in India chiefly for the sake of a bland oil, not unlike sesamum oil, which burns in small hand-lamps, without smoking. This product is known as ram-til oil in Mysore. We are puzzled by your other question. Do you mean the olden lentil (*Ervum Lens,* L.)? Could you let me see a small sample?

W. F. (Shaw Hall, Botanical Society, Greenfield.)—We believe the specimens are *Erigeron bonariensis* and *Escallonia rubra.*

H. B. (Prestbury).—The ferns are *Adiantum caudatum, Cheilanthes fragrans,* and *Nothochlæna vellea.*

D. R. B. (Picton, Bunbury, West Australia).—Only one specimen we suppose to be named came to hand. It was a pretty mounted flower, a *Thysanotus,* probably *T. proliferus.*

B. SHARPE.—The example sent, was not in a good state for examination. Try *Dysoxylon.*

W. H. J. (Uppingham).—The plant labelled *d,* is *Medicago falcata.*

R. A. B. (Glasgow).—Pardon our overlooking the specimens so long. They are as follows:—No. 1. *Equisetum talmateia;* No. 2. *Hieracium vulgatum;* No. 3. *Briza media;* No. 4. *Poa alpina;* No. 5. A *viviparous* specimen, probably *Poa sp.*

EXCHANGES.

WANTED, the following dried grasses for Herbarium, the numbers in the London Catalogue (7th edition) are 1485, 1486, 1487, 1563, 1575. A list of duplicate grasses and plants would be sent to select from for exchange.—G. Garrett, Harland House, Wherstead Road, Ipswich.

ABOUT twenty specimens of *Helix Pisana,* from Tenby, in exchange for a few chalk or other fossils.—Rev. K. Deakin, Almondsbury, Gloucestershire.

SCIENCE-GOSSIP for 1875, 1876, unbound, having duplicates will exchange for a good Coddington or Stanhope lens.—Jas. Thompson, Mersy Mills, Hadfield, near Manchester.

WANTED, a vase, or any example of ancient British pottery; large or small, from a tumulus, earth-work or other position; or a Romano or Roman-British pot. Will give in exchange a good collection of correctly-named lichens from the Scottish mountains, or a collection of well-mounted and named slides of microscopic fungi for the microscope.—Worthington G. Smith, 15 Mildmay Grove, London.

WANTED, Menge's Preuss. Spinnen, Thorell's "Remarks on Synonyms of European Spiders," or Walckenaer et Gervais, Hist. Natur. des Aptères."—Thos. Workman, Belfast.

WELL-MOUNTED micro slides, in exchange for side-blown eggs, works on ornithology, or bound volumes of SCIENCE-GOSSIP.—Laing, 71 Shobnall Street, Burton-on-Trent.

WANTED, spawn of natterjack toad for *Nitella translucens,* or select from Mr. Bolton's list.—M. H. Robson, 18 Albion Place, Newcastle-upon-Tyne.

WANTED, fossils, in exchange for fossils from Rhætic, Inf. Oolite, Dundry, Red Crag.—Rev. H. B. Capel, Great Eastern Rectory, Dunmow.

MOUNTED slides of Foraminifera, &c., and good material, for rare British and foreign shells, or offers. Lists exchanged.—E. R. F., 82 Abbey Street, Faversham.

AUTHENTICATED, side-blown eggs: lamageier, levant sparrow-hawk, lanner, saker, Greenland, Iceland, jer, eleonora falcons, golden, spotted, booted, imperial, tawny, bonellis eagles, and 500 other species offered in exchange. Specially wanted, swallow-tail, kite.—Sissons, Sharrow, Sheffield.

H. pygmea, H. rupestris, H. lapicida, L. glaber, L. fulvus, C. tridens, C. minimum, in exchange for Succineæ or Clausiliæ, except *rugosa.*—George Taylor, Mold, North Wales.

WANTED, a small portion of glass-rope sponge, "*Hyalonema mirabile.*" Good micro slides given in exchange.—Albert Firth, Ballymurphy, Belfast.

DUPLICATES of any of the following British land and fresh-water shells offered, and localities recorded where found. *Succinea oblonga, Lim. involuta, Lim. Burnetti, Pupa ringens, Vertigo pusilla, V. substriata, V. alpestris, V. minutissima, V. angustior, V. moulinsiana.* Desiderata, numerous foreign land, fresh-water and marine shells, as well as many of the varieties of our British land and fresh-water shells, such as Limnaceæ, Planorbis, Succinea, and Physa.—W. Sutton, High Claremont, Newcastle-upon-Tyne.

FLOWERS of *Sparmannia Africana* for other microscopic objects, or Zoophytes, Australian Zoophytes for others. Foreign correspondence wanted.—B. B. Scott, 24 Seldon Street, Kensington, Liverpool.

HAIR of English bat, unmounted, for unmounted parasite or weevil.—C. Bradley, Oxford Street, Marlborough.

SYNAPTA from Belfast harbour, and skin of eel from Lough Neagh, with other objects mounted and unmounted, for good slides; send lists.—W. Gray, Mount Charles, Belfast.

"BIBLIOTHECA HISTORICA, NATURALIS," "Bibliotheca Medico-Chirurgeia," and "Anatomico-Physiologica," Leipzig, half calf, new, in exchange for sea-weeds. Zoophytes (unmounted) chalk fossils or foreign butterflies.—M. Cattrell, 58 Berwick Street, Liverpool.

WISH to exchange Hooker's "Student's Flora," for work on Zoophytes.—A. Thomson, 17 Wynne Street, Liverpool.

BRITISH birds' eggs, sixty varieties. British birds in cases, sparrow-hawk, red grouse, water-hens, green woodpecker, &c., in exchange, good micro slides.—J. R. Murdoch, Horsforth, near Leeds.

GOSSE'S "Omphalos," "Vestiges of the Natural History of Creation," W. Phillips' "Mineralogy," Heath's "Fern Paradise," M. Plues' "Rambles in Search of Flowerless Plants," all in good condition. Exchange British or foreign mosses, lichens, or good micro slides.—J. R. Murdoch, Horsforth, near Leeds.

WANTED, foreign land shells, chiefly Asiatic Clausilias, and Philippine species, offered many shells, British and foreign, in exchange. Address, Miss F. M. Hele, Fairlight, Elmgrove Road, Cotham, Bristol.

FINE slides of decolorised and stained leaves, showing crystals, hairs, stomates; also picked diatoms from Bermuda deposits, and others; offered in exchange for good material, only, such as diatomaceous gatherings, fresh-water algæ, zoophytes, desmids, &c. Send lists to J. Tempère, 12 Cecil Street, Manchester.

FOR well-finished slides of *Xenodochus carbonarius, Puccinia Adoxæ, P. Betonicæ, Ustilago longissima,* hairs of mouse, or living *Hydra viridis,* send good named slides (physiological preferred) to William West, 15 Horton Lane, Bradford.

SECTIONS of the following woods, in exchange for microscopic slides or shells. 1. Palm; 2. Robinia pseudo-acacia; 3. Barr wood; 4. Partridge wood; 5. Satin wood; 6. Pollard oak; 7. Walnut; 8. Iron wood; 9. Bay wood; 10. Queen wood; 11. Rio rosewood; 12. Zebra wood; 13. Bahama lignum vitæ; 14. Purple wood: 15. Turkey boxwood; 16. Crocus wood; 17. Dantzic oak; 18. Mexican lignum vitæ; 19. Mahogany.—J. J. Cotton, Ael-y-don, Barmouth.

FOR living specimens of *Melicerta ringens,* send well-mounted slide to—George Sampson, 14 Market Place, Chesterfield.

SLIDE of calcareous plates of Holothuria for well-mounted slide.—J. B., 36 Windsor Terrace, Glasgow.

FRAGILLARIA VIRESCENS, a pure gathering, in exchange for guanos, recent material, &c.—W. M. Paterson, Loftus.

WANTED, *Hypericum dubium, Carex rupestris, Cynoglossum sylvaticum, Anchusa officinalis, &c.,* for other rare plants.—G. C. Druce, Northampton.

LONDON CATALOGUE, 7th edition. Wanted Nos. 41, 43, 44, 151, 182, 212, 235, 251, 284b, 284c, 321, 588, 590, 613, 1060, and others. Many good specimens to offer in exchange. Send lists of duplicates and desiderata to A. W. Preston, Marple Bridge, Cheshire.

BOOKS, ETC. RECEIVED.

"The Hæmatite Deposits of West Cumberland." By J. D. Kendall, F.G.S.

"North Staffordshire Naturalists' Field Club Report for 1878."

"Proceedings of the Chester Society of Natural Science," No. 2.

"Is Diphtheria Preventible?" By E. T. Blake, M.D. London: Hardwicke & Bogue.

"Midland Naturalist." March.

"Land and Water." March.

"American Quarterly Microscopical Journal." January.

"Science News." February.

"American Journal of Microscopy." January.

"Bibliography of North American Invertebrate Palæontology." By Dr. C. A. White and Professor H. A. Nicholson.

"Le Monde de la Science et de l'Industrie." February.

"Botanische Zeitung." February.

"Proceedings of the Literary and Philosophical Society of Liverpool," Vol. xxxii.

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 9TH ULT. FROM:—E. E.—M. H. R.—J. T.—W. G. S.—G. S.—S. M.—C. R. S.—J. W. S.—W. M.—F. H.—G. G.—J. L. P.—F. J. W. O.—J. H.—J. A. W.—G. T.—C. F. G.—L. C.—T. H. G.—G. T.—J. W. D.—W. H. J.—G. R.—J. L.—E. R. F.—T. R. I.—H. B. C.—T. W.—H. L. B.—R. H. N. B.—M. S.—Dr. M. M. B.—A. F.—G. O. H.—F. M. H.—W. H. L.—M. C.—J. R. M.—C. L. W.—A. W.—A. T.—W. G.—W. H. N.—C. B. C. McI.—C. R. B.—B. B. S.—E. M.—T. W. H.—W. M.—I. W. Jun. C. P.—Dr. G. A. S.—J. J. C.—W. K.—J. F. M.—W. S.—A. J. J. B.—C. J. A. C.—B. H.—J. T.—W. W.—H. M. H.—W. B. F.—W. J. B.—T. M. R.—G. S.—A. M.—D. H.—J. J. B.—J. B.—J. H. W.—Dr. P. C. Q.—W. M. P.—R. L.—A. W. P.—G. G. P.—G. C. D.—D. P.—&c.

THE NEW FOREST.

By E. D. Marquand.

ROUGHLY speaking the New Forest may be said to comprise that portion of Hampshire which lies between the Southampton Water on the east and the Avon on the west, extending from the coast line as far north as Braemore, Bramshaw, and Totton; or, in other words, the whole of the south-western corner of the county as far as the Avon. Strictly, however, the forest only touches the sea for five miles or so near Lymington, while its western limit falls short of the river by some three or four miles. Though it includes the largest and finest tract of wild unenclosed woodland in the kingdom, there is actually within its borders less of wooded than open country. "Within equal limits," says Gilpin, in his "Forest Scenery," "perhaps few parts of England afford a greater variety of beautiful landscape than the New Forest." The northern portion consists chiefly of wild rugged woods, many presenting the same aspects and features as they did in the days of the Red King: below this is a zone of undulating moorland, breezy heaths all aglow in spring and summer with golden gorse and purple heather, with little rivulets winding and turning until lost among the emerald sphagnum and snowy cotton-grass — unfailing indicators of spongy and often dangerous bogs: and further southward we come to the cultivated district, a fair region of ploughed fields, meadows and shady lanes, dotted over with detached farms and little villages, each possessing its three proverbially necessary constituents, a church, a smithy, and an inn.

Within this territory nature has scattered her gifts with no sparing hand; and yet, though perhaps no portion of the United Kingdom of equal area is more interesting from a naturalist's point of view, the New Forest is still to a very large extent, a *terra incognita*. Year after year it produces new insects and plants, and it is a matter of regret that, notwithstanding the number of diligent and careful observers who annually spend a few weeks or months here, so very few are willing to impart their knowledge by writing an odd paper now and then for publication in such a widely-read journal as Science-Gossip. Flowering plants and lepidoptera seem everywhere to have received considerably more than their share of attention—perhaps because books upon these subjects are always readily accessible; but there are other branches of entomology and botany, equally interesting, but sadly neglected from the scarceness of information about them; and if those who make special studies of these would occasionally take the trouble to pen a few dozen lines showing the most important characters of genera and species, they would confer a great boon on a large section of students to whom large and costly works or voluminous "Transactions" are beyond reach. The papers on the diptera, for instance, in the eleventh and twelfth volumes of Science-Gossip, are an excellent example, and the authors deserve sincere thanks for their labour; so also are the articles on diatoms, desmids, and foraminifera in the earlier volumes. Papers of this kind are of more practical value than discussions about the correct pronunciation of scientific names, or lengthy quotations from the works of tenth-century naturalists, however good these may be—and they undoubtedly are—in themselves.

If any one will look through the fourteen volumes of Science-Gossip in the hopes of gleaning information upon the natural history of the New Forest, he will find two or three papers on lepidoptera, perhaps a couple of very meagre ones on phanerogams, and possibly an odd note or two recording a rare capture or discovery. This is not very much certainly, so with a view of adding somewhat to the general know-

ledge of this interesting district, I have strung together a few notes from my own observations on the fauna and flora during a residence of three years in the heart of the forest; they may be suggestive, and if they possess any merit, it is that of accuracy. But it is necessary for me to state *in limine*, that I have had nothing to do with a large portion of the forest proper; my observations have been confined to an area about a dozen miles square, that is to say, from Beaulieu and Marchwood to the Avon, and from Stoney Cross to the sea, and even this is rather outside the mark, for the north-western section I have scarcely even walked through.

Among the mammalia, *feræ naturæ*, which inhabit the forest, the most worthy of consideration is the deer. A quarter of a century ago they were very numerous, and old inhabitants speak of it as then an ordinary thing to see a dozen or more wild deer in a walk from Brockenhurst to Lyndhurst, but about twenty years ago they were nearly all killed off owing to the injury they caused to the young trees. Now they are seldom seen, and thrice only have I come upon them in their native haunts. Foxes are more plentiful, but it is more usual to see sly Reynard with a pack of yelping hounds at his heels than to catch him *à sang froid.* An animal which is now almost extinct in the forest is the badger. I once got within sight of a singular beast which puzzled me extremely, he was neither a dog nor a cat, that was evident; but I could not get a clear view of him on account both of his distance and of the thick furze and heather which intervened. But away I went in hot pursuit: when he ran I ran, and when he stopped to look round, as he often did, I stood still; however I made but little advance on him, perhaps rather the reverse, when suddenly the animal disappeared and refused to show himself again. Some time afterwards, on describing this creature and its movements as well as the locality to a gamekeeper, the man said: "Oh it was a badger, there's no doubt—but they are very rare." Otters also are not often heard of, but their excreta may occasionally be met with near streams. A year or two ago a pair of old ones and two whelps were found in the forest by a woodman, and he, hoping to secure at least the young ones alive, hastened off for assistance, but on his return they were gone, and no one could discover their whereabouts. Squirrels of course abound, and so do moles; stoats and weasels are seldom seen alive, but a "keeper's tree" always shows a goodly number. One of the most amusing scenes I ever witnessed was a kind of serio-comic race between a stoat and a rabbit. The latter might easily have got clear away from his pursuer, but he evidently preferred running round and round within a dozen paces of where I stood and eventually succeeded in fairly tiring out the stoat. What surprised me was the utter absence of any sign of fear on the part of the rabbit—and while the stoat displayed the most bloodthirsty determination and savage ferocity, the other, it was clear, treated the whole affair as altogether a capital bit of fun, and seemed particularly pleased to find that a featherless biped was present to witness the humiliating defeat of his mortal foe.

At least three species of bats inhabit the forest: the Noctule, or Great Bat (*Vesp. noctula*), the Long-eared Bat (*Plecotus auritus*), and the Pipistrelle (*Vesp. pipistrellus*). Of the second I have seen but one example sufficiently near to identify it with certainty. Gilbert White, who gave the name *Vespertilio altivolans* to the noctule, says, "The little bat appears almost every month in the year, but I have never seen the large ones till the end of April." In this neighbourhood, where they are more numerous than at Selborne a century ago, I have seen the Great Bat on the wing on April 6th, and once as early as the 18th of March.

That the bite of the adder (*Pelias berus*) is under certain circumstances fatal is probably true enough, though I know of no well-authenticated record of a thoroughly healthy person dying from its direct effects. But one thing is beyond question—its bite has very unpleasant results, sometimes even necessitating the amputation of the limb. A man here was bitten in the hand and lost the use of his arm for four months. Adders are found in these parts in considerable numbers, and in hot weather it is very imprudent to ramble about in the woods without wearing gaiters, or, failing these, the best thing is to tie the trousers tightly around the ankle; the danger being less of a bite *through* the trousers, than that the reptile in its fright may take refuge *inside* them, an occurrence which once happened to a forest keeper I know, and this so terrified him, though he shook off the brute and escaped unharmed, that he never goes into the wood now without having his understandings encased in stout leather. The dread of all creeping things extends here to the pretty little brown lizard and the slow worm, both of which are invariably cut to pieces as mortally dangerous vermin. A bright reddish-purple variety of the latter known as the "red adder" is regarded with the utmost terror, because it is supposed to be more venomous than the viper itself.

One or two words as to the birds. As might be expected their number both of species and individuals is large; a good list is given in Mr. Wise's book of the New Forest, enumerating no less than 230 out of 354 recognised British species. I am told that at present there is but a single pair of honey buzzards in the forest, and their eggs are so greedily sought after that there is but scant chance of the number increasing, except when they happen to build where the nest may be effectually protected, as was the case two years ago, when the honey buzzards built in a tall tree on a gentleman's estate, and the proprietor, with rare good sense, ordered his keepers to watch the nest day and night, and gave them strict injunctions

not to lean on the side of tenderness in dealing with would-be intruders. An osprey was shot on the coast last year. I saw it in the hands of a taxidermist at Lymington. Snipes and woodcocks remain here in small numbers throughout the year, and their eggs are found every season. Peewits breed in great numbers among the bogs. During the months of March and April the heronry at Vinney Ridge presents an animated appearance. There on the topmost branches of some of the tallest and finest beeches in the forest the herons may be seen sitting on their broad flat nests, or engaged in feeding their young. The trunks of these splendid trees are four or five feet in diameter, smooth and branchless up to a height of some twenty feet, and one would suppose the nests were inaccessible—even to the proverbial nesting boy—yet many of the eggs are taken. For this purpose large iron spikes are securely attached to the legs, and the climber makes the ascent by sticking these into the tree step by step: but it is a perilous feat, and one which requires a steady nerve and a cool head. The herons always lay twice and frequently three times in each season, beginning early: by the second week in April the young are already half grown. In May or June they leave their nesting haunts and retire to the coast. I have seen three of the woodpeckers: the green, the greater spotted, and lesser spotted, but the first is by far the most common, indeed, although the shrill squeaking laugh-like note of the two last is not an unfamiliar sound it is not often that the birds themselves are seen. Nut-hatches are pretty common and are known by the euphonious name of "mud dabbers" from their habit of plastering mud around the holes which lead to their nests. Kingfishers are scarce, and I have rarely seen two at once. Speaking of these birds, perhaps it is not generally known that they can and do procure their food from the sea as well as fresh water. I recollect observing this in Sark, one of the Channel Islands, where kingfishers are numerous, though there is not in the island a stream or (with one exception, I think) a pond big enough to sustain a minnow. More than once I have seen them among the rocks at low tide. The wryneck arrives here about the 1st or 2nd of April, and the cuckoo about the 20th. Nightingales are very plentiful, and usually begin to sing towards the middle of April. Swallows, house and sand martins arrive the second or third week in April, and swifts during the first days of May. Our latest summer visitant is the night-jar, which begins its singular churring note usually on the 16th or 17th of May; last year however I heard one as early as the 7th. These birds breed commonly on heaths, and lay their eggs—never more than two—on the bare ground. On one occasion I found a pair of night-jar's eggs as late as the 5th of August, this I noted in SCIENCE-GOSSIP, vol. xiii. p. 259.

(*To be continued.*)

SKETCH OF THE GEOLOGY OF CARDIFF AND SURROUNDING DISTRICT.

To those interested in geological pursuits there are few localities possessing so many advantages and at the same time offering such a varied field for research, as the neighbourhood of Cardiff. Such being the case, a brief outline of the leading features of the district may not prove uninteresting to some of your readers.

The town of Cardiff is built upon the western portion of a large plain, the surface of which is not much above high-water mark, in fact, some parts of the surrounding moors are periodically covered with tidal water at the vernal and autumnal equinoxes; geologically speaking, it cannot have been long since the waters of the Severn flowed regularly over, and indeed far inland, to where Cardiff now stands. The surface soil consists of a foot or two of stiff clay, resting upon rolled blocks and pebbles brought by the action of water from the older rocks of the district; these in turn rest upon the Keuper marl of the Triassic formation.

Cardiff boasts the possession of splendid dock accommodation, and is visited by the mercantile fleets of all nations for that important article of commerce, steam coal, for which South Wales is justly famous.

The geological map of Great Britain defines a large district in the neighbourhood of Cardiff as being occupied by Old Red Sandstone deposits. This to a great extent is correct, but a careful re-survey of the district would very materially alter the boundary of this formation, and cause the introduction of a considerable tract of Silurian to be substituted. It is to be hoped these alterations will be made at no ve y distant period.

The Silurian deposits are well exhibited in a section on the river Rumney, about two miles from Cardiff, where a total thickness of rock exceeding 700 feet is exposed. These beds are replete with the customary fossils of the upper or Ludlow series, and at present it is a moot point whether deposits representative of the Wenlock series may not also exist here.

The only rising ground of any importance in the immediate neighbourhood of Cardiff is Pen-y-lan. This is a low hill composed entirely of Silurian deposits; a small quarry nearly at the top of the hill has furnished the writer with a typical collection of the interesting fossils of this formation. This spot will repay the visitor for the walk, as a commanding view of the British Channel, the flat and steep Holmes, the coast of Somersetshire, and the Liassic plateau of Penarth, and Leckwith can be obtained from here.

From the Silurian to the Lias represents an enormous thickness of deposits, yet, if we except the Permian and Lower Lias, the entire sequence may be obtained within a radius of about a dozen miles

from Cardiff. Caerphilly, with the ruins of its ancient castle, lies to the north of, and is distant from Cardiff about seven miles. A walk over the Rhymney Railway reveals the following section: After passing over the alluvial deposits at Cardiff, we enter a cutting through a bed of river gravels; this

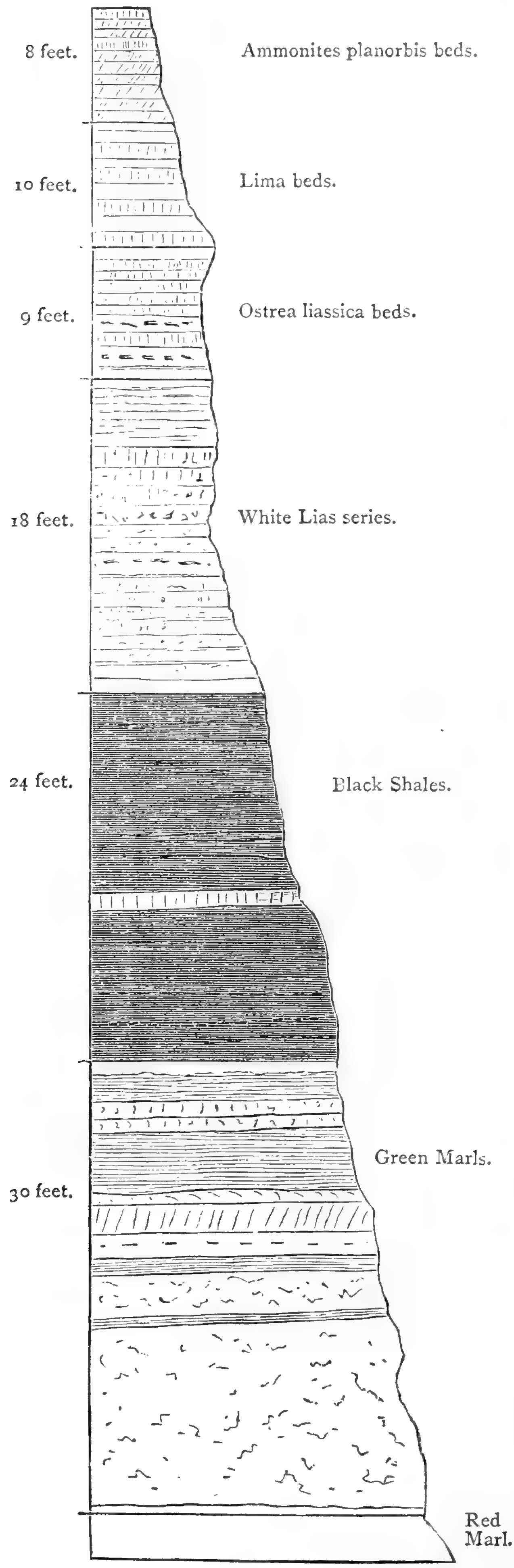

Fig. 89.—Section of Rhætic beds at Penarth.

is immediately followed by a cutting in the Silurian, and is the most westwardly exposure hitherto discovered in this district; it is, in fact, a prolongation of the base of Pen-y-lan referred to above. A heavy embankment occurs for about a mile, which brings us near Llanishen, where we enter a fine section of the Old Red Sandstone, consisting of conglomerate pebble beds, beds of grey and red sandstone alternating with beds of similar coloured marls; these are succeeded by the carboniferous limestone, millstone grit, and lower coal measures.

These rocks at once mark a significant change in the features of the landscape; rising to over 850 feet above sea level, they form the Caerphilly mountain, under which the Rhymney Railway is carried by a tunnel 1760 yards in length. In walking over the mountain we pass over the denuded and upturned edges of the Old Red Sandstone, carboniferous limestone, millstone grit, and, on the northern slope, between the summit and the town of Caerphilly, twelve seams of coal, alternating with beds of sandstone and shale, crop out. About two miles further to the north, the great anticlinal axis which divides the South Wales coal basin into two unequal troughs is met with. It is composed of Pennant sandstones; these furnish good building material, and from some of the beds an excellent paving-stone is obtained. The thickness of these sandstones, as ascertained from sinkings, is over 480 feet.

The currents which brought the material for the formation of these rocks also brought large portions of the vegetation of the period, which have been well preserved in a quarry at Pwll-y-pant; some of the beds are literally crowded with such remains. When first exposed the external portion of the wood is found converted into pure coal having a cubical fracture inside, the wood has been fossilized, and an excellent idea of its structure may be obtained by preparing thin sections for microscopical examination. By far the larger portion of these remains consist of *Sigillaria*, but from the fact of *Dadoxylon antiquus*, *Pinites*, *Lepidodendron* and *Psaronius* having been discovered, a careful examination would doubtless reveal to an investigator of fossil botany many other descriptions of the flora of the coal age.

That these remains have been subjected to considerable attrition is indicated by the ends of each piece of wood terminating in a blunt point, while not unfrequently patches of fossilised vegetable matter may be found. These are undoubtedly the comminuted fragments worn from the stems and branches during the turbulent state of the water, and held in suspension until it became more tranquil, when they were finally deposited in the slight inequalities of the sea bottom.

The general arrangement of the beds in this section is briefly as follows: when the Silurian is first met with the dip is about 23 degrees to the N.E. The embankment referred to occupies a depression where the beds

become horizontal; at Llanishen the dip is about 22 degrees to the S.W., gradually increasing in angle of dip as the tunnel is approached, where the beds are seen to fold over an anticlinal axis and again dip to the N.E. at an angle of 33 degrees.

A trip by the steam ferry, occupying about ten minutes, lands you at Penarth, where one of the best sections of the Rhætic series in this country is exposed in the cliff. Penarth Head, about 160 feet high, contains the following series of beds. The base consists of red and pale green marls, enclosing large lenticular masses of gypsum. Beds of impure limestone succeed—the surface of one of these beds presents a very uneven surface when exposed, in the depressions of which large quantities of fish remains occur, consisting of teeth, spines, and scales of various species, prominently among which may be mentioned *Nemacanthus filifer*, *N. monilifer*, *Hybodus reticulatus*, *Acrodus minimus*, *Sargodon Tomicus*, *Gyrolepis Alberti*, *Saurichthys apicalis*, and *S. acuminatus*. Then follow a series of black shales, with occasional beds of impure limestone but exceedingly fossiliferous, containing *Axinus*, *Pullastra*, *Pecten Valoniensis*, *Cardium Rhæticum*, *Avicula contorta*, *Myophoria postera*, *Gervillia*, &c. These beds are succeeded by the White Lias series, commencing with sandy shales, passing into beds of limestone containing *Lima præcursor*, *Modiola minima*, *Anatina Suessi*, and still ascending we met with the Ostrea beds containing *Ostrea liassica*, *Plicatula*, Lima shales, with *Lima præcursor*, and lastly the Ammonites Planorbis beds with the fossil giving them their title. Reptilian bones are not unfrequently met with, consisting of *Ichthyosaurus*, *Plesiosaurus*, &c.

Following the cliff along to Lavernock, about two miles in a southwardly direction, the various beds may be examined in detail, as their undulations bring them within easy reach for observing more minutely.

At Lavernock the coast suddenly trends to the west and a very fine exposure of the Lias opens up. The beach from low water to the base of the cliff is covered with some of the beds, the natural fracture of which gives the beach the appearance of having been artificially paved. From this point the flat and steep Holmes (two islands of carboniferous limestone) are prominent objects standing off in the channel about three or four miles from the mainland.

At Radyr and at the junction of the Penarth line with the Taff Vale Railway near Llandaff, excellent exposures of the dolomitic conglomerate occur, marking the site of the coast line of the Triassic Sea, it consists of angular, subangular, and water-worn blocks of the older rocks of the districts cemented in a matrix of a rich red colour; the stone can be wrought in blocks of almost any dimensions, and is much used when substantial masonry is required. Hitherto it has not furnished the writer with any fossils other than those found in the contained blocks of older rocks.

The amount of denudation which has taken place in this district is enormous. Abundant evidence remains to convince any one the coal strata must have been continuous from South Wales to the Bristol and Somerset coal-field, as also the underlying Old Red Sandstone. The vertical thickness of these rocks added to those exposed in the cliffs from Penarth to Southern-down amounts to between one and two miles, a mass of rock which only a corresponding immensity of time would be sufficient to remove.

W. H. HARRIS.

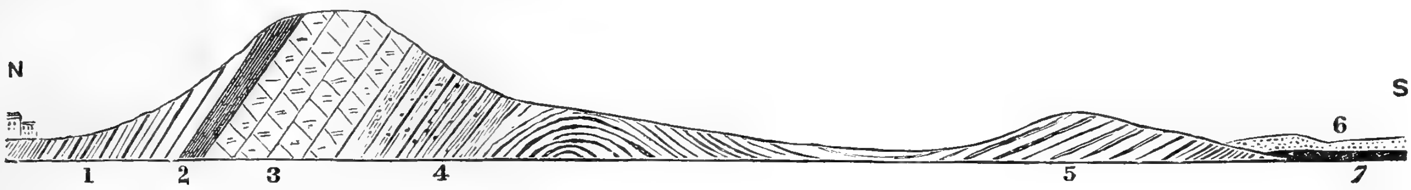

Fig. 90.—Section from Cardiff to Caerphilly. 1. Coal measures; 2. Millstone grit; 3. Carboniferous limestone; 4. Old Red Sandstone; 5. Silurian; 6. Gravels; 7. Trias.

THE PREPARATION OF INSECTS FOR MICROSCOPICAL EXAMINATION.

By H. M. J. UNDERHILL.

THERE is a great deal of literature on the subject of "microscopical mounting," and I hesitated much before I decided to contribute yet another paper to the amount. Notwithstanding, I believe that the particular branch of "mounting" of which this article treats, is but imperfectly understood. When I was a member of the Postal Microscopical Society, I used to see the slides of some hundred and twenty microscopists, among which were a great many of what the club calls "professional slides." It seemed to me that the majority of the entomological specimens, both those by "amateurs" and "professionals" were badly set up, and that, with a few agreeable exceptions, even those which might be called good slides were mounted upon principles radically faulty. This being a fairly large circle from which to judge, I suppose that most entomologists who use a microscope set up their preparations after the same fashion, and therefore I have written a paper on a well-worn theme.

A man commencing the study of insect-anatomy reads a few "hints on mounting" in some book; the

remarks treat of mounting in general, and the beginner applies to insects methods suitable to histological, vegetable, or mineral objects. His principles are at fault, and his productions are more or less failures. This paper is not about mounting in general, and, although many of the methods detailed may be good for other classes of objects, it is only for the preparation of insects and similar things that they are here recommended.

In preparing any object, one's aim should be to obtain an absolutely correct idea of it. One should therefore endeavour firstly to set it up in a natural manner and position, and secondly to display every detail. It is always to be borne in mind that details shown by distortion give an incorrect idea of the object, and that the knowledge thus gained being inaccurate, is therefore nearly useless.

By the ordinary method of preparing insects, everything is sacrificed to the display of minute details, and preparers are ambitious of doing on one slide what can only be properly done on two, three, or four. This ambition results in a radical fault, namely the use of undue pressure, in order to bring all parts of the object to one level. Again, a wish to mount slides rapidly induces the employment of heat in order to harden the balsam quickly. For mounting diatoms, a skilful manipulator tells me that hardening the balsam thus brings out the markings. His slides fully bear out his words. But for insects, nothing can be worse than heat, for it produces an opalescent transparency, which makes markings partially invisible, and this effect is aided by the increased density given to the balsam.

The methods which I venture to recommend avoid the use of undue pressure and of heat, while, at the same time, not only will they give a better general idea of an object than the methods ordinarily in use, but also will bring out details much more distinctly.

Insects cannot all be mounted in the same way, and, according to the points which it is desired to show, so must the method of mounting vary. I will first describe the various media and processes of mounting, and then say something of the different insects for which they are suited.

The media I employ may be divided into two classes: A, those which are aqueous, and B, those which are resinous.

CLASS A. *Medium* 1.—To every fluid ounce of glycerine add ten drops of ordinary acetic acid. Almost everything may be mounted in this medium. *Medium* 2.—Glycerine jelly. For details of its manufacture I refer readers to SCIENCE-GOSSIP 1874, p. 54. Carbolic acid should be used to prevent the growth of fungi, instead of Baric chloride as there stated. I do not recommend glycerine jelly, except in a very few instances, and therefore I do not trouble the reader with what I said at a former time. *Medium* 3.—Distilled water. To every fluid ounce of water add 20 drops of carbolic acid; boil until the acid be dissolved, and filter through blotting-paper. This medium is solely for mounting specimens of opaque objects.

CLASS B. *Medium* 1.—Canada balsam. I consider test-tubes by far the most convenient vessels in which to keep this resin. Fill a test-tube with two-thirds of old balsam and one-third of benzine. A friend tells me that new balsam does just as well, but of that I have no experience. The mixture should be of the consistency of cream. *Medium* 2.—Gum dammar. Take two parts of gum dammar and one part of gum mastic: pound them in a mortar, and fill a test-tube quite full of the powder, but do not ram it down: now pour in benzine until the test-tube will hold no more. Cork the tube tightly, and let it stand in an oven for a few hours, until the solution be quite clear and all sediment has sunk to the bottom. Filtering is quite unnecessary. Gum dammar by itself dries very brittle, and besides, I have never been able to clarify it. These mixtures of Canada balsam and of gum dammar may be used indifferently for unstained specimens. I do not know that one is better than the other, but for stained specimens it is better to use only gum dammar, because the natural oils in the balsam cause some colours to fade.

PROCESS I. *To mount an object in glycerine.*—A cell is necessary for all but the very thinnest objects. Fixing a cell is some trouble, but it is seldom that anything deeper is required than a glass slip with a countersunk cell. As some people are always complaining (quite needlessly) of the difficulty of "sealing cells," I describe my method: fill the cell with glycerine; pick out all air bubbles with a pair of forceps, put the object in the cell; take up the thin glass cover with the forceps, breathe on its underside, and place it carefully (do not drop it) on the cell; press the cover down, taking care to keep the object in the middle, and secure it with a clip. Leave the slide for an hour in order that all superfluous glycerine may be pressed out; then take it up and wash it in clean water by dipping it in, and moving it gently backwards and forwards. Wipe the ends of the slide with a towel; absorb all the water about the cover with blotting-paper, and then varnish it *very thinly* with 'Bell's cement.' Knotting varnish, such as is sold in ordinary oil shops will answer the purpose, but slides sealed with this are apt to leak. Therefore I prefer Bell's cement, which can be bought at C. Baker's, High Holborn. Three coats of varnish should be put on before the clip is taken off, and the slide may then be "ringed" on the turn-table in any way that suits the mounter's fancy.

For mounting in jelly I again refer readers to the back number of SCIENCE-GOSSIP. Objects may be mounted in water in the same way as in glycerine; washing the slide after putting on the clip, however, is unnecessary.

PROCESS II. *To mount in balsam or dammar.*—With a turn-table draw a ring of water-colour paint

in the middle of the slide. If the object be very thin put a small drop of the medium on the slide, place the object in it, and put on the cover, wetted with benzine, and press it down only very lightly indeed. It is but seldom that entomological objects are thin enough for this, so, in an ordinary way, proceed as follows. On the ring of paint at equal distances apart, place three small chips of cover-glass of a thickness just slightly less than that of the object to be mounted; arrange the object which should be quite wet with benzine, in the middle; put on the cover, secure it with a clip, and let the medium run under by capillary attraction. All bubbles not inside the object will ultimately disappear, but sometimes they need "coaxing" to make them go. The clip must be left on for half a day or a week, according to the nature of the object. Any shrinkage of balsam from the edge of the cover must be carefully filled up. Slides mounted in this way should be left at least six weeks to dry. The superfluous balsam may be scraped off neatly by placing the slide in the turn-table, and using a sharp bradawl to cut the balsam. A good margin of balsam must be left round the edge of the cover. The slide must be first varnished with balsam, but it may be finished according to individual fancy.

If the object be too thick for any bits of cover-glass, I generally use a slip with a countersunk cell. Nothing is easier than to mount with these. I should use them almost always, if they were not twice the price of smooth-edged slips.

I will now speak of the processes for preparing insects for mounting. It is on the proper carrying out of these that the worth and beauty of one's slides depends.

To prepare an insect for being mounted in glycerine. First process: Simply soak it for a week in glycerine. Second process [to be used if the insect be curled up]: soak it for a day or two in acetic acid, then for half a day in distilled water; this makes the legs spread out. Soak it in weak glycerine; then in stronger, and finally in pure glycerine, then mount it. Third process: For this refer to the first process for Canada balsam. Insects are prepared for glycerine jelly in the same way as for glycerine; for carbolated water they are prepared by simply soaking them in it for some time.

To prepare insects for balsam or dammar.—First process: After partial dissection, soak the specimens in liquor potassæ in the usual manner; when they are sufficiently transparent, complete the dissection, and boil them in clean liquor potassæ for ten seconds: wash them in distilled water, soak them for at least half an hour in acetic acid. [It does no injury to leave them in this for a week, but an hour or so is all that is needful.] This gets rid of all potash. Wash them well in distilled water, and then in methylated spirit. [If they are to be mounted in glycerine instead of in balsam, they should be transferred to that medium without being put into spirits at all, but only well washed in water.] Soak them for a quarter of an hour in absolute alcohol, and then in oil of cloves for a short time. The oil of cloves is not absolutely necessary, but it is safer to employ it. Objects should not be left for more than a week in oil of cloves, since they are made hard and brittle by it. They may now be mounted in balsam or dammar, but it is better to wash them first in benzine, in which they may be kept for any length of time. Second process: For displaying muscles [applicable to naturally transparent objects only]. Soak for three or four days in ether, transfer at once to oil of cloves. Or, if the object be curled up, soak it in water to expand it, and transfer it to the oil by methylated spirits and alcohol, as described in the first process. Third process: For the same purpose and with the same limitations as process two. Soak for a very short time in potash; be very careful not to press the object at all, and proceed as in the first process, but without any boiling.

For soaking in potash I use half-drachm stoppered bottles; for acetic acid, staining fluids, &c., little glass pots, which I buy at Baker's for *2d.* each. For boiling I use little porcelain evaporating dishes with handles, which I buy at Griffin & Sons', 22 Garrick Street, Covent Garden.

(*To be continued.*)

A NEW METHOD OF PREPARING A DISSECTED MODEL OF AN INSECT'S BRAIN FROM MICROSCOPIC SECTIONS.

By E. T. Newton, F.G.S.

(*Read before the Quekett Microscopical Club, January* 24, 1879.)

THE structure of the nervous centres of Invertebrate Animals is a subject which is attracting some attention at the present time, and I have myself been much interested in the study of the insect's brain; but have found some difficulty in clearly comprehending the forms of certain of the internal parts. In order to get a better knowledge of these forms, I was led to construct a model, on a principle which I believe to be entirely new. Knowing the interest which our honoured president and the members of this club always take in new methods of working, I felt constrained to bring the matter before you, and it is the purpose of the present paper to describe the manner in which this model has been constructed. Whether the method will prove available for other objects, time alone will show.

It will perhaps be desirable, before commencing the description, for us to call to mind the general form of an insect's brain. Some of us endeavoured on our last "Gossip night" to get a general know-

ledge of the anatomy of an insect, and, with regard to the nervous system, we noticed that the most anterior pair of ganglia, which is placed in the fore part of the head, is joined by two large commissures to the second pair, which is placed lower down, and towards the back part of the head. Through the ring thus formed the gullet or œsophagus passes, and hence the anterior ganglia, being above, are termed

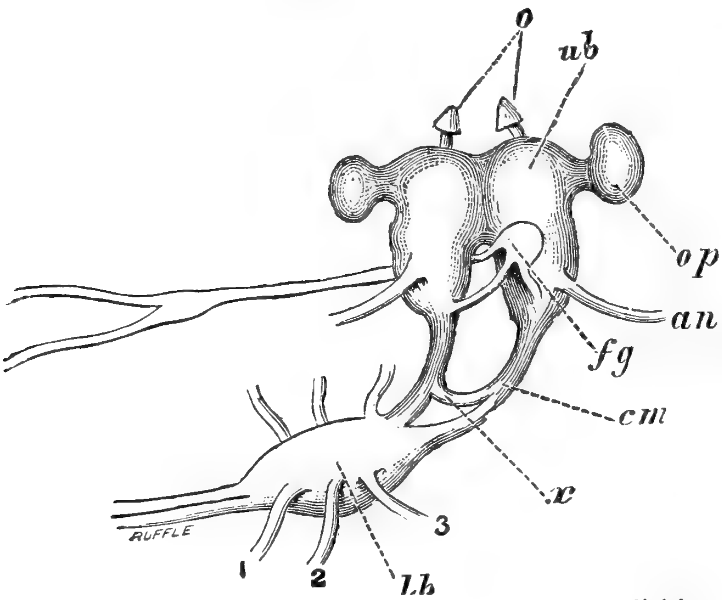

Fig. 91.—Brain of mole-cricket, after Dietl.—*ub*, upper division of the brain, or supra-œsophageal ganglia; *lb*, lower division of brain, or infra-œsophageal ganglia; *cm*, commissures between upper and lower divisions of brain; *x*, a cross-band of fibres peculiar to mole-cricket and some other insects; *an*, antennary nerve; *op*, optic ganglion; *o*, ocelli; *fg*, frontal ganglion of stomato-gastric nerve; 1, 2, 3, nerves to mouth organs.

the *supra-œsophageal ganglia*, and the second being below, are called the *infra-œsophageal ganglia*. The positions of these parts is very well shown in the diagram of these ganglia, taken from a mole-cricket (fig. 91). The upper ganglia present two rounded prominences above, from the sides of which the optic nerves are given off (*op*), while at the top are seen two ocelli. Somewhat lower down, and towards the front, are two other prominences, from which the antennary nerves pass off (*an*). A little lower down a nerve is given off from each side, the two joining in the middle line to form the frontal ganglion (*fg*); from this a single nerve passes backwards along the upper surface of the alimentary canal. Below and behind the large commissures (*cm*) pass to the lower ganglia (*lb*), and, being long in the mole-cricket, the two pairs of ganglia are well separated. In some insects they are much closer together.

From the lower pair of ganglia the nerves are given off which supply the mouth appendages. The researches of Faivre, in 1857 ("Du Cerveau des Dytisques dans ses rapports avec la locomotion," "Ann. d. Sci. Naturelles Zool." tome viii. p. 245) seem to show that the power of co-ordinating the movements of the body is lodged in the infra-œsophageal ganglia, and, therefore, it is not without reason that some authors regard these as a part of the brain. What follows in this communication refers only to supra-œsophageal ganglia, or, as I should prefer to call them, the upper division of the brain.

The general arrangement of the internal structures will, perhaps, be best understood by reference to the figure given by Leydig, of the brain of *Formica rufa* (fig. 92). ("Tafeln zur vergleichenden Anatomie," 1864, t. viii.) Upon each side there is a large central ovoid mass (*pl*), which has been termed the *primary lobe*, and this abuts in the middle line upon its fellow of the opposite side, while the optic nerve, with its ganglion (*op*), is given off from the outer or opposite end. The optic ganglion itself is a very complex structure. The antennary lobes (*al*) consist of a number of large rounded masses, which have been called cells, but are really made up of a network of fine fibres. Above the primary lobe are seen the peculiar bodies, having the appearance of half-rings (*mb*), which have been called convolutions, by Dujardin. ("Sur le système nerveux des Insectes," 1850, "Ann. Sci. Naturelles Zool." sér. 3, tome xiv. p. 195), and have been compared to mushrooms.

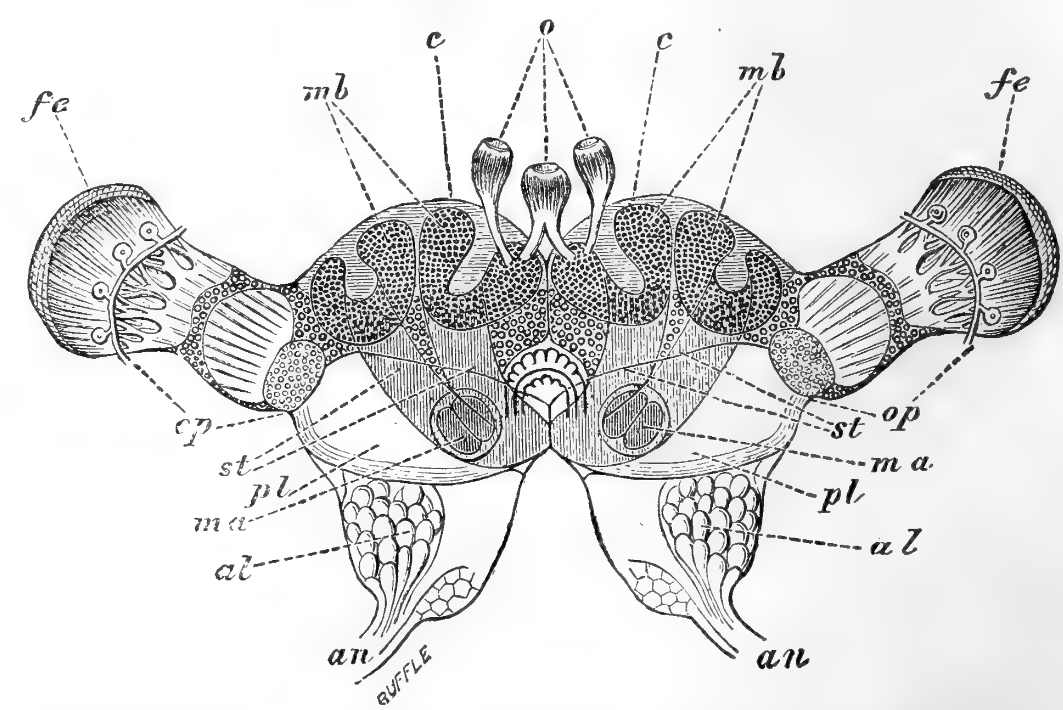

Fig. 92.—Brain of *Formica rufa*, adapted from Leydig.—*pl* primary lobe; *al*, antennary lobe; *an*, nerve to antenna; *op*, optic ganglion; *fe*, facetted eye; *o*, ocelli; *mb*, mushroom-bodies; *st*, stems of mushroom-bodies; *c*, cap of cells covering the mushroom-bodies; *ma*, optical section of the anterior mass of nervous matter.

Each of these mushroom-bodies is supported upon a stem (*st*) which passes downwards into the primary lobe, where the two lie close to each other, if they do not join.

The exact form of these mushroom-bodies is not easy to be made out from preparations such as that figured by Leydig, and, indeed, the appearance presented by sections does not convey a very clear idea of their form.

In the middle of the primary lobe, as figured by Leydig, there is a rounded mass, which he describes as a "giant nucleus" (*ma*), but more recent researches have shown that Leydig was mistaken, and that this appearance is really the optical section of a cylinder of nervous matter, which passes forwards, to end abruptly upon the front surface of the brain. The structure was correctly described by Dujardin, in 1850, but does not seem to have been recognised by Leydig; this was, no doubt, due to the method of investigation employed by the latter, which consisted in clarifying the brain (previously hardened in alcohol) in potash solution, or glycerine.

With regard to the origin of the nerves of the ocelli (*o*), it is desirable that Leydig's figure should be verified, for it seems very improbable that they should arise from the heads of the mushroom-bodies in the ant, and from a different part of the brain in other insects.*

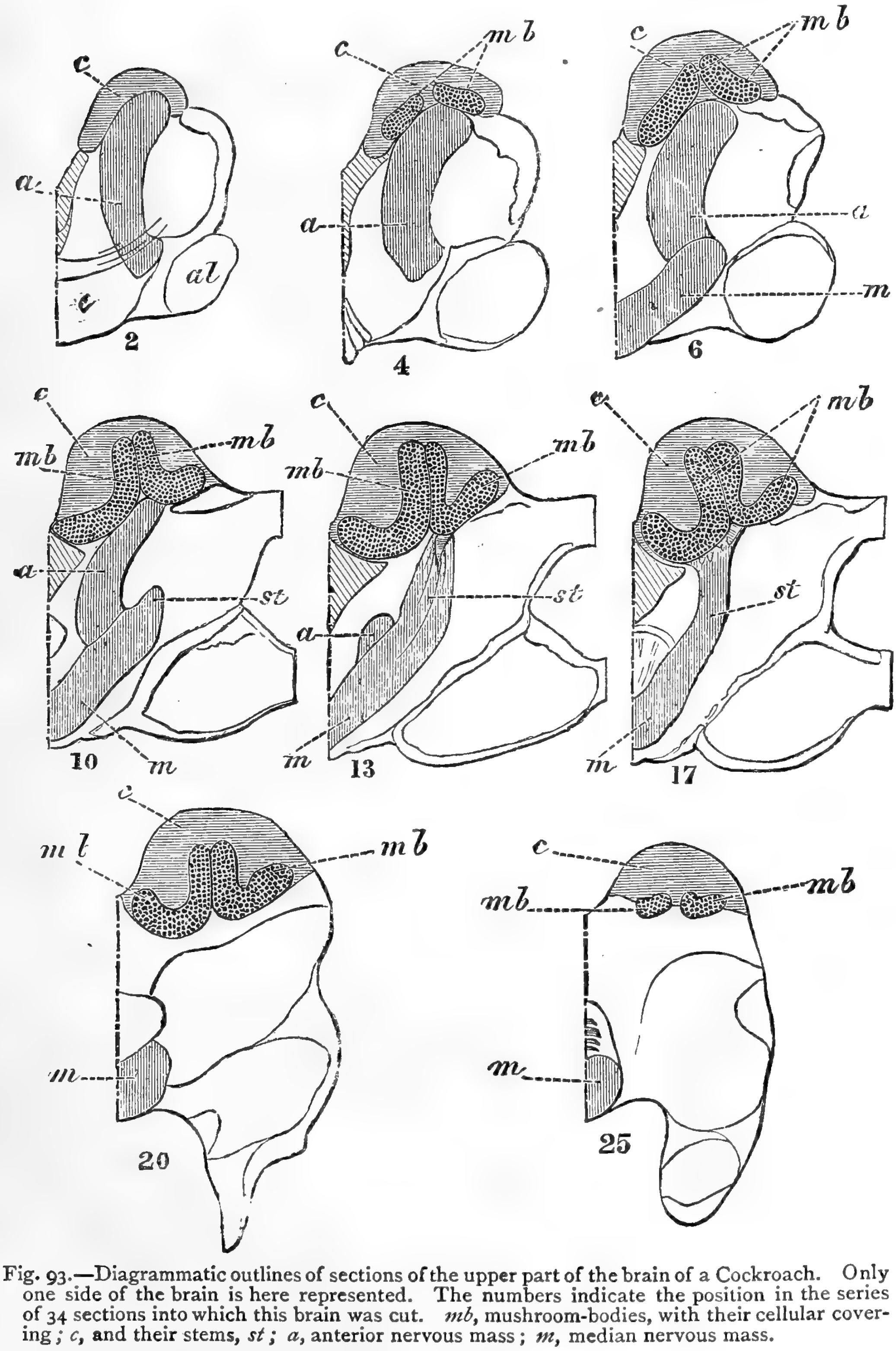

Fig. 93.—Diagrammatic outlines of sections of the upper part of the brain of a Cockroach. Only one side of the brain is here represented. The numbers indicate the position in the series of 34 sections into which this brain was cut. *mb*, mushroom-bodies, with their cellular covering; *c*, and their stems, *st*; *a*, anterior nervous mass; *m*, median nervous mass.

Insects' brains vary very considerably as regards the development of the mushroom-bodies. In ants, bees, and wasps they are proportionately large, and double on each side. In the cockroach they are double, and moderately well developed, and in the mole-cricket there is said to be only one on each side. Dujardin could not detect these mushroom-bodies in the diptera; but recent investigations (E. Berger, "Untersuchungen über den Bau des Gehirns und der Retina der Arthropoden," "Arbeiten des zoolog. Instituts zu Wien," Bd. i. Heft ii. p. 173) show that certain bodies exist in the blow-fly (*Musca vomitoria*), and the house-fly (*M. domestica*), which, most probably, are correctly regarded as the homologues of mushroom-bodies.

I had already prepared sections of the heads of several insects, some of which have been exhibited at our meetings, before I saw the paper by Dr. Dietl ("Zeitsch. f. wissenschaft. Zool." 1876, vol. xxvii. p. 488), in which some beautiful sections of insect brains are figured and described. When I saw them I determined to try the method he had used for hardening the brains, namely, with hyperosmic acid. The insect which I selected to work upon was the cockroach (*Blatta orientalis*). In the first place it was necessary to remove the brain from the head in a perfectly fresh condition, and this required some care, because the organ itself is extremely delicate,

* I find, since this paper was written, that according to Flügel, these nerves pass down beside the mushroom-bodies to the middle of the brain. ("Zeitsch. f. wissenschaft. Zool." 1878, vol. xxx. suppl. p. 556.)

and if the investing membrane be injured the internal parts are apt to be squeezed out in the hardening process. The fresh brain, cleared from the surrounding parts, was placed for a few hours (6 or 8) in an aqueous solution of hyperosmic acid ($\frac{1}{4}$ to $\frac{1}{8}$ per cent.) It was then washed and laid in spirits of wine. The hyperosmic acid seems to me to be somewhat uncertain in its action, for sometimes the brains remained soft and unstained in the interior, while at other times the hardening and staining was most successful throughout.

The next point was to cut up the brain in a definite direction into consecutive sections of a known thickness.

So much has been said in this club lately about section cutting, that it would only be wearisome to attempt to describe the process fully. It may, however, be mentioned that a microtome was used, in which the screw for raising the object was divided, so as to register a thickness of about $\frac{1}{1000}$ inch. The brain was embedded in wax, in the usual manner, and each slice, as it was cut off, was placed directly upon a glass slip in a drop of glycerine, and numbered. When the entire brain had been disposed of in this way, the sections were cleared of the pieces of wax adhering to them, covered with thin glass, and cemented down.

The sections which appear to me the most instructive are those cut in a direction as nearly as possible parallel to the front of the brain. One brain, cut in this direction, gave me thirty-four slices, each about $\frac{1}{1000}$ inch thick, and as no intermediate pieces were lost—although some were subsequently injured in the process of mounting—I had the whole of this upper division of the brain in a consecutive series of slices, and, therefore, in a very satisfactory condition for work. Any one who, in working out structures by means of sections, has endeavoured to trace the various parts through a series of slices, will understand how difficult it is to keep in mind the structures seen in each, so as to picture to himself the form of any part when entire. And still more difficult is it to convey to others the knowledge which one has gained by the examination of such a series.

Now it seemed to me that, if a drawing of each section of the series were made, and the corresponding portions in each coloured some definite tint, then the structures presented would be much more easily understood, inasmuch as they could all be laid before the eye at one time. I determined, therefore, to prepare such a series of drawings with the camera lucida, and the diagrams numbered 2, 4, 6, 10, 13, 17, 20, 25 (fig. 93), represent the most typical sections of this series; only one-half of each section being here represented.

In section No. 2 may be seen, at the lower part, a portion of the antennary lobe (*al*). In the middle is a mass of nervous matter, here distinguished by vertical lines, and marked (*a*). Above this is a cap-like portion, distinguished by horizontal lines (*c*). These are the portions which should be borne in mind in passing through the series.

In No. 4 we find that while the parts noticed in No. 2 remain much the same, two dark masses (*mb*) have appeared in the upper portion, close to the mass (*a*), but definitely separated from it.

In No. 6 the dark masses have increased in size and become somewhat curved, but the most obvious difference is that the mass (*a*) has suddenly extended inwards and downwards to the middle line of the brain (*m*).

In No. 10 the dark masses are much more deeply curved, the upper portion of the mass (*a*) is rather less, and another process has begun to extend upwards and outwards (*st*).

In No. 13 the most important point to notice is that, while the inner mass (*a*) has almost disappeared, the outer one (*st*) has extended upwards, and may be seen to join the outer dark mass.

In the 14th section the outer mass (*st*) joins the inner dark mass also, and this junction extends as far as the 18th or 19th section.

In No. 17 the outer mass (*st*) may be seen joining both the dark masses, which are here very deeply hollowed out.

In No. 20 the outer mass has entirely disappeared, and we have simply a small portion of the lower mass (*m*) left close to the middle line, the dark masses are somewhat smaller. The extension (*com*) seen just below the antennary lobe is the commencement of the commissure to the lower division of the brain.

In the sections which follow, all the parts above mentioned, excepting the commissure (*com*), get gradually less, and the dark ones are seen, for the last time, in section No. 25. The median portion (*m*), however, may be traced to the 28th section.

The next step in the process was this: It occurred to me that, if the card, upon which these outlines were made, were of a thickness proportionate to the enlargement of the drawings, and if each were cut out, and the whole piled together, one ought to have a model of the exterior of the brain. I set to work, therefore, to do this, but in order to lessen the labour as much as possible, it being merely an experiment, it seemed desirable to make one half first, and instead of making models of the whole series, the thickness of each slice was doubled, so that it was only necessary to make seventeen, taking, as a pattern, every alternate drawing.

The material used was soft pine-wood, each piece being about $\frac{1}{8}$ inch in thickness. Having cut out each model slice with a fine saw, the whole were piled together in their relative places and temporarily fixed, so that the corners might be trimmed off, and the result was the form which is seen in the model of one half of the upper brain (fig. 94). The different slices, however, were not left fixed together, but were separated and arranged so

that they might be taken to pieces, as in the process of cutting sections, and the surfaces thus exposed were coloured to represent the sections as they appear under the microscope.

This method of modelling was capable of still further development. Having modelled the opposite half of the brain upon the same plan, I drew upon each of the model sections, thus produced, the outlines of the more important parts, as shown in the diagrams (fig. 93), and these were then cut out in the same manner as a child's dissected map-puzzle. Now it will be obvious that by taking from each of these "dissected" sections, the part, for instance, which is in the diagrams (fig. 93), marked (*c*), and joining them together in their relative places, we shall have a model of that particular part; and by joining, in like manner, the dark masses, and those marked (*a*), (*m*), (*st*), we shall obtain models of the mushroom-bodies, with their stems, etc. In this manner the dissected portions of this side of the brain were joined together, and, after some little trouble in adjustment, one was enabled to make the parts fit together in their relative places. We have now, therefore, upon the *left* side, a model which may, so to speak, be cut up in slices, to show the microscopic appearance of the sections (fig. 94), and on the right side, a model of the more important internal structures, which may, as it were, be dissected out before a class of students (fig. 95).

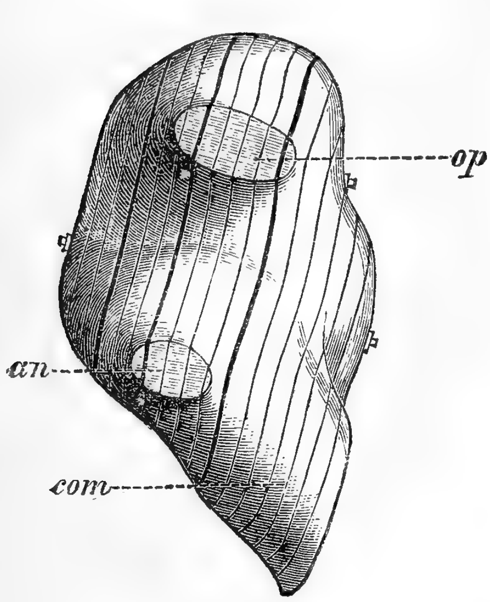

Fig. 94.—View from the outer side of the left half of model of upper part of brain of Cockroach. The oblique lines in this and fig. 95 indicate the successive slices of which each is composed. *op*, cut end of optic nerve; *an*, cut end of antennary nerve.

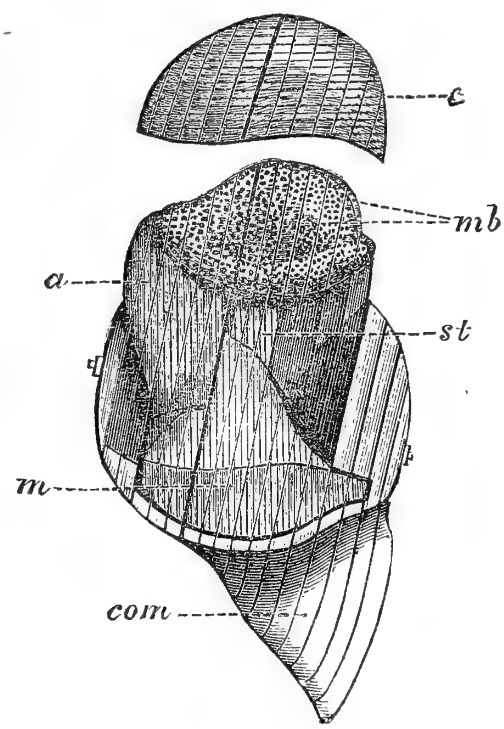

Fig. 95.—Right half of model-brain seen from the inner side, with the parts dissected away, so as to show the anterior nervous mass, *a*; the median mass, *m*; the mushroom-bodies, *mb*; and their stems *st*. The cellular cap, *c*, has been raised, so as to display the parts below; *com*, is a part of the commissure to the lower portion of brain, or infra-œsophageal ganglia.

I was in hopes that, before reading this paper, I should have been able to construct a similar model of the brain of a bee, in order to verify the descriptions of Dujardin, Dietl, and others, who have worked at this insect, but have not yet had the opportunity. This, I may say, however, that an examination of this model goes far to prove the correctness of their descriptions, for we see here a mass of nervous matter ending abruptly on the front surface of the brain, this extending backwards, and being joined by the stems of the mushroom-bodies, and reaching nearly to the back of the brain, after being gradually reduced in size. The heads of the mushrooms are seen to be, as described originally by Dujardin, discs folded upon themselves, and bent downwards before and behind. No doubt the forms of these parts differ in the bee and the blatta, but still, in their principal features, they are much alike.

I cannot help thinking that a model such as this gives a far better idea of the true form of the internal parts, than it is possible to obtain from a study of sections alone, and, indeed, even if these minute structures are dissected out, there is great fear of their being distorted in the process. But, after all, the great use of such models is to enable the lecturer, or demonstrator, to convey to his students a correct knowledge of the parts under consideration, and I trust that this model may be the means of enabling some of us to comprehend, more easily than we otherwise should, the complex structures of an insect's brain.

BOTANICAL WORK FOR MAY.

British Batrachian Ranunculi.

SOME ten years ago we could not (perhaps being a little prejudiced) believe that all Babington's water ranunculi were specifically distinct; however, time has wrought a wonderful change in our opinions; we now look upon them as a beautiful series of examples, all differing in some degree, yet linked together to form one harmonious whole; we hope to carry this conviction home to all our readers. We have often been surprised to find so few of our botanists who seemed to care to study these plants, and yet they all confess they should like to know more about them; now let us endeavour during the present month, to search anew every pond and ditch in our neighbourhood, and carefully compare specimen with specimen: we shall all be astonished at the

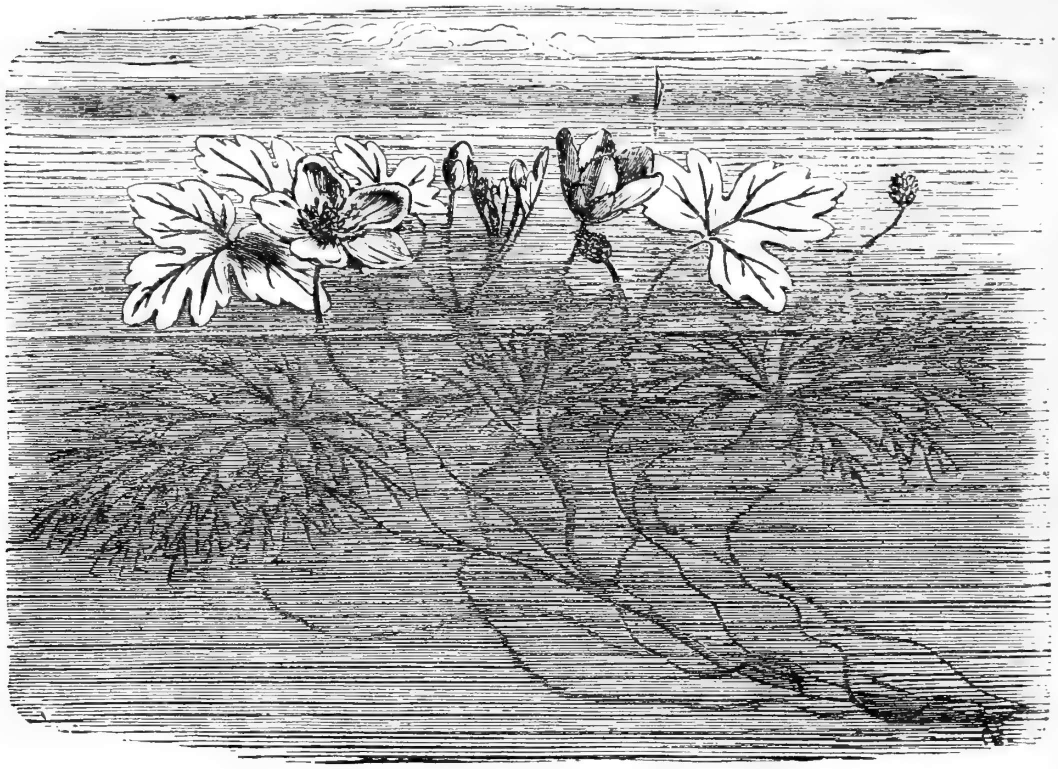

Fig. 96. The Water Crowfoot *(Ranunculus aquatilis).*

result. To many of our readers this will add a new study to one which is getting threadbare.

Our space being necessarily limited, we may be pardoned by passing over the history of the Batrachian ranunculi, without any remarks; our object is to make them simple and plain to every botanist, for so far as our flowering plants are concerned, they ought to be recognised at a glance.

First, looking at the whole of our aquatic ranunculi, we readily perceive they naturally divide into two sections:

(A.) Found growing only in muddy or boggy places, and devoid of submersed leaves.

Fig. 97.—*Ranunculus heterophyllus.*

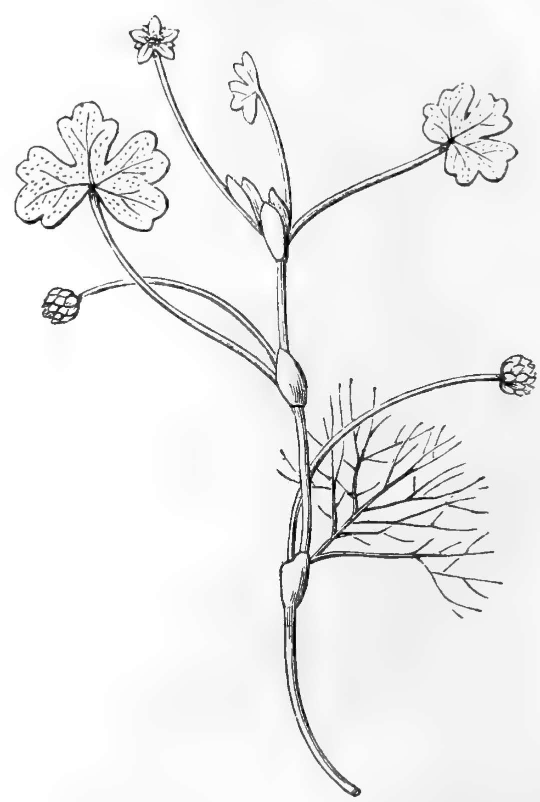

Fig. 98.—*Ranunculus tripartitus.*

(B.) Floating water plants.

Section I.

1. *Ranunculus hederaceus* (Linn.). Leaves spotted, small. Flowers very small; pets. 3-veined. The point of the style, on the carpel (seed-vessel) always at the side.

2. *R. Lenormandi* (E. B. S.). Leaves much larger than above, not spotted. Flowers large; pets. 5-veined. The obovate carpel with a terminal point; syn. *R. cœnosus*, (Guss.)

Section II.

Div. I. *Without floating leaves.*

3. *R. trichophyllus* (Chaix). Submersed leaves dark green; segments short, rigid, apiculate. Flowers very small. Easily known by its short, pointed, dark green leaf-segments.

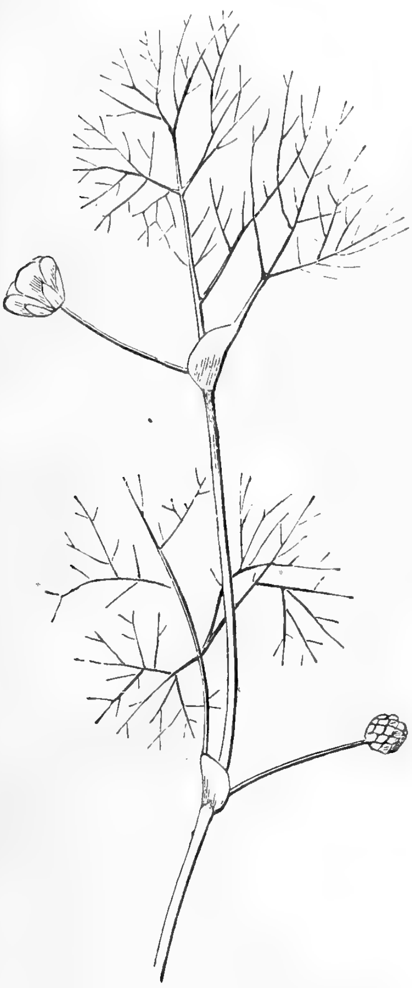

Fig. 99.—*Ranunculus Drouettii.*

4. *R. Drouettii* (F. Schultz). Submersed leaves bright green, segments collapsing (*i.e.* when taken from the water they are like a camel's-hair pencil when in use), not apiculate.

5. *R. fluitans* (Lam.). Submersed leaves very long, linear. Flowers very large. Generally found in shallow rivers, abundant in the Severn.

6. *R. circinatus* (Sibth.). Segments all in one plane, rigid, in a roundish outline, forming a flat, rigid disk. Flowers very small.

Div. II. *With floating tripartite leaves.*

NOTE.—All the species comprised in this division may be recognised better from the illustrations, the characters bear such a strong resemblance or similarity, except to those who have studied them long and carefully.

7. *R. heterophyllus* (Sibth.). The submersed leaves of this species have long filiform collapsing segments. Floating leaves nearly circular in outline, and with long petioles; style hooked.

8. *R. confusus* (Godr.). Leaf segments not collapsing, rigid. Floating leaves semicircular, flat; style recurved. The stem of this species rises out of the water.

9. *R. Baudottii* (Godr.). Floating leaves tripartite. Leaf-segments olive-green, apiculate, not collapsing. Flower stalks often exceed the leaves in length. Carpels inflated at the end.

10. *R. peltatus* (Fr.). We combine *R. floribundus* (Bab.) with this species, being unable to detect any difference. Flowers numerous, sweetly-scented, large. Floating leaves almost circular in outline.

11. *R. tripartitus* (DC.). St. rising out of the water. Pets. very small, often slightly tinged with pink. The submersed leaves often absent, then it has a close resemblance to *R. Lenormandi.* It is a very distinct species.

12. *R. pseudo-fluitans.*—Submersed leaves long, with flat segments resembling *R. fluitans.* Floating leaves tripartite. Flowers (rarely seen) about as large as heterophyllus. This is a very variable plant, sometimes the segments are collapsing, but more frequently long and rigid.

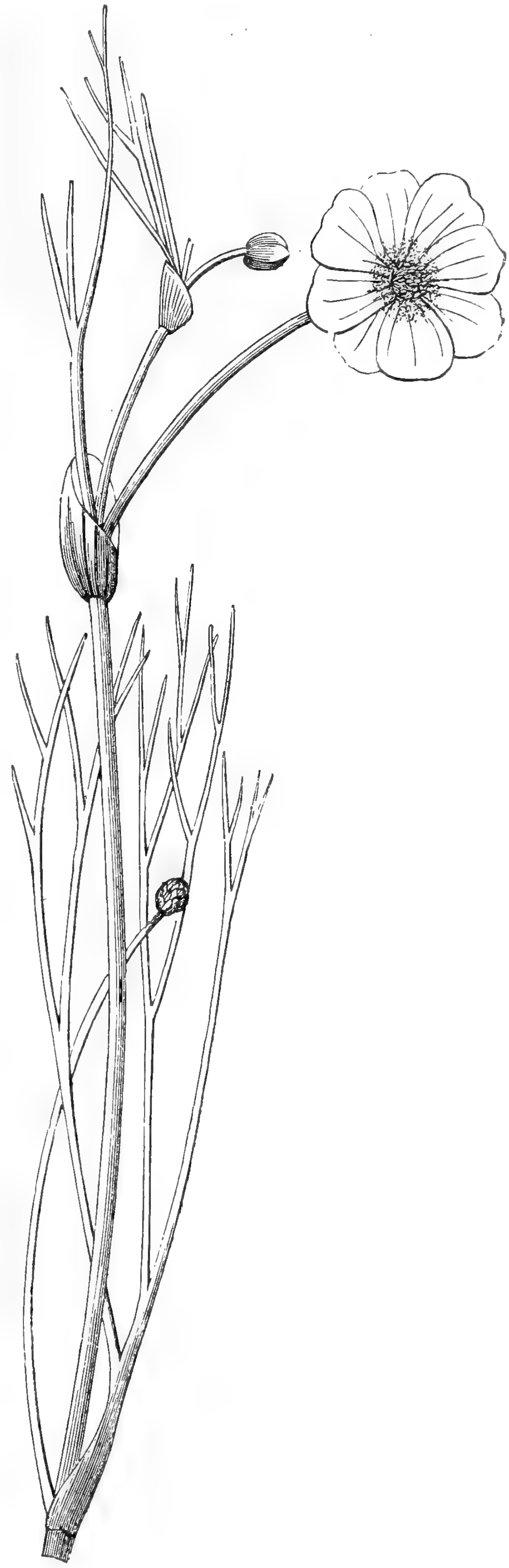

Fig. 100.—*Ranunculus fluitans.*

The following characters are most reliable :

No. 3. Known at a glance by its dark green leaf-segments ; No. 4. Leaf-segments light-green, filiform and collapsing ; No. 5. Leaf-segments very long, linear ; No. 6. Segments of leaves having a roundish outline, and all in same plane ; No. 7. Floating leaves almost circular ; No. 8. Floating leaves flat, semicircular ; No. 9. Floating leaves tripartite ; No. 10. Flowering abundantly, and with delicate perfume ; No. 11. Flowers exceedingly small, submersed leaves very rare ; No. 12. Differs from No. 5 chiefly, by having floating leaves.

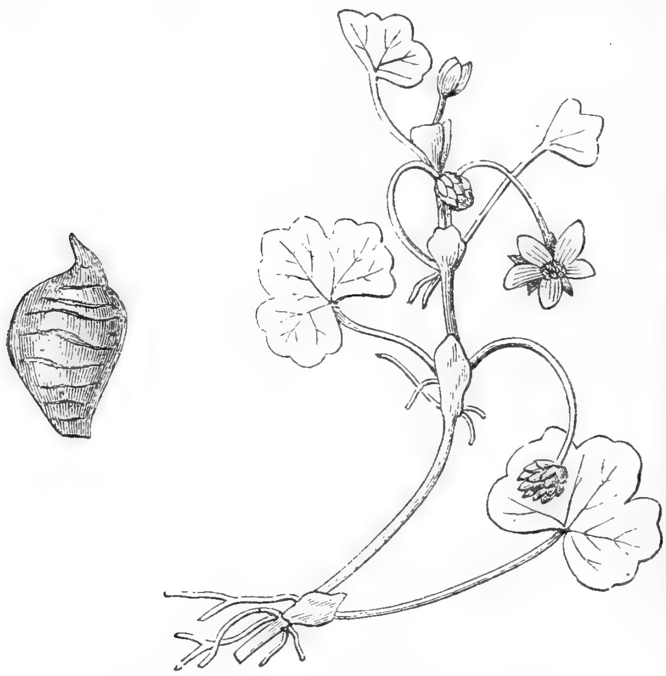

Fig. 101.—*Ranunculus Lenormandi.*

MAY FLOWERS IN WALES AND SHROPSHIRE.

IN Hertfordshire the primroses were over, hyacinths run to seed and later summer flowers coming into blossom, when in the middle of May we left that county for Shropshire, and stayed at Bucknell, on the borders of Wales. Here the early spring and the summer flowers were all in blossom together. We climbed a high hill and passed through an oak wood, where the ground was covered with primroses and anemones, side by side with *Geranium sylvaticum* and Lychnis. Masses of beautiful broom grew on these hills, Chelidonium in the hedgerows and meadows full of *Orchis morio.* We walked one day from the Craven Arms Junction, where the rail to Ludlow branches off, to Norton Camp on the top of the hill. Close to the camp is a wood, where we found *Saxifraga granulata* growing as thickly as *Stellaria Holostea* does in Hertfordshire. It looked very pretty in the long grass on the ledges of the steep rocks which overhang the valley where Stokesay Castle lies. From Craven Arms Junction it is but a short distance by train to Church Stretton, which looks so charming lying close under the range of wild hills.

The Longmynd is windy and treeless, but there is plenty of beauty and colour about it. Along the top is a broad turf track, smooth as a racecourse, along which we walked. We could see the Wrekin and Malvern Hills as we climbed upwards from Church Stretton, afterwards on the left the Ludlow Hills and Clee Hills ; on the right we looked across those strange Stiper stones, and out to the Welsh hills over the fertile valley, where we could see Bishop's Castle.

The colour of the foreground to these distant blues and pale greens was very remarkable, owing to the splendid tints of the whortleberry leaves. On the Longmynd they grew in spreading tracts over the turf, shading from a deep crimson to brilliant orange. The plants were full of light pink blossoms, and our feet were covered with honey as we passed through them. When nearly at the end of the Longmynd range, we descended to the left into the valley near the branch line that runs to Bishop's Castle. This railway is certainly very rural and unsophisticated ; it is grown with grass and weeds, and as we came up a flock of sheep which had just been washed in the river close by, was driven slowly along the rails with much baa-ing and barking of dogs. Children played on the line and strolled hand in hand under the gay broom bushes which hung in the cutting, oak boughs and firs drooped over the fences on either side, and almost hid the signal-post. We walked along the line also ; the sheep turned off at the little shed which served as a station. I sat down to sketch on a heap of old sleepers until in course of time a short train came slowly up ; the children disappeared, the shepherd with his dog under his arm stood to watch us start, the broom came in at the windows as we passed along.

On the rocks above the Teme, when on our way along the hills to Ludlow, we found *Lithospermum arvense.* Wild garlic spread like a carpet over some of the woods.

The month of May was a very wet one, even for Wales. We went to Rhayader by the Builth railway in pouring rain, past dreary Llandrindod with its miserable attempt at modern streets and smart hotels, in the midst of what was once a pretty common enough if uninteresting. At Builth Road we saw the name of that station very neatly written in fine thrift, which can be recommended to station-masters. The letters are bright green all the winter and covered with pink blossoms in the summer. We drove from Rhayader up the Nantgwyth valley, beside the Elan, which was like a winter torrent, and saw at the edge of the oak woods the pale yellow flowers of the Globe Flower (*Trollius Europæus*). Later on we walked through meadows full of Trollius near Rhayader and Builth. Close to Cwm-Elan is the "Lily Bank," of rocks and oak-trees, with lilies-of-the-valley growing thickly in beds along the ledges ; the blossoms were just coming out.

We found plenty of Pinguicula in blossom on the hills, looking like large bright violets, also *Gnapha-*

lium dioicum. Bird-cherry grew in the hedges. In one place was plenty of buckbean (*Menyanthes trifoliata*). Oak-fern grew near the Elan, and beech-fern almost under the little mountain waterfalls. Some of the old walls were full of common spleenwort and *Cystopteris fragilis.*

We went to Aberedw, near Builth, and walked over the hill to see Llewellyn's Cave, a little three-cornered hole with a wooden door. On our way we found *Saxifraga hypnoides* amongst the rocks, and some tall specimens of *Meconopsis Cambrica.*

Pinner's Hill. M. A. TOOKE.

MICROSCOPY.

POLLEN.—It is pleasant, if only for a moment, to turn away from the bloodshed of Zululand to the calm possibilities of scientific research and induction. This is suggested to us by a capitally-printed paper we have received on "Pollen," read before the Natal Microscopical Society in November last by Mr. Maurice S. Evans. This paper is a valuable one, and gives us a good deal of original research. In the discussion which followed, Mr. Adams (the hon. secretary) referred to Taylor's "Flowers; their origin, shapes, perfumes, and colours," in which it was stated that ants never assisted in fertilising plants, the hairs of which the author thought were intended to keep the ants off. Mr. Adams said he had himself seen ants not only carrying off pollen, but entire anthers. This, however, only proves that ants are unwelcome visitors to flowers. What is meant by the author of "Flowers" is not that ants were unable to carry off pollen, but that they were unable to beneficially effect cross-fertilisation, and that they are insects to be guarded against by flowers, rather than welcomed.

QUEKETT MICROSCOPICAL CLUB.—A conversazione of this society took place at University College on March 14, and was attended by upwards of a thousand visitors. The guests on arrival were received by the President, Professor T. H. Huxley, who was supported by the Vice-Presidents and Secretary. Microscopes to the number of 185 were exhibited in the museum and libraries by members and their friends from kindred societies, in addition to which a large number of instruments and objects were displayed by the principal opticians. An interesting lecture "On Curious Houses and Queer Tenants," was delivered by Mr. May in the Mathematical Theatre, and frequent exhibitions of polariscope and other beautiful objects and preparations took place in dark rooms by means of oxyhydrogen microscopes; whilst an excellent band discoursed sweet music in the famous Flaxman Hall. The general arrangements were such as to call forth much praise, and the great scientific interest and admirable manner in which the greater part of the microscopic objects were shown could not fail to be remarked. In addition to the microscopes there was a good display of stereoscopes and objects of interest, including a number of scientific diagrams contributed for the occasion by Messrs. Hardwicke & Bogue.

A NEW METHOD OF PRESERVING INFUSORIA.—The development of minute animalcules in infusions of animal and vegetable substances when undergoing decay has excited much interest amongst the medical profession, on account of the light which recent researches have shed upon the mode which bacteria have of spreading disease. For the study of these minute forms it is very desirable that we should possess some means of obtaining a permanent preparation of them which would facilitate their examination. As regards bacteria and vibriones, especially those on which M. Pasteur's researches have shed so much light, and also those of Professor Tyndall, I have been experimenting upon a method by which this could be done; and after some years of patient research I have at last been rewarded with a very excellent method, and for the benefit of the readers of SCIENCE-GOSSIP I now send it you. The following things will be necessary:—A bottle of thin Canada balsam diluted with chloroform, a hot-water plate and a few glass dishes, and the fixing solution, which is made in the following manner: to 25 cc. of chromic oxydichloride acid is added 50 cc. of water with 5 cc. permanganate of potash. First draw a large ring of white wax upon the slide much larger than the covering glass, then place the vorticellas which you wish to preserve in the ring with some water. When they have attached themselves to the slide some of the chromic oxydichloride solution must be added, which will instantly fix the specimen in the position. After remaining about three minutes the water may be poured out, and a few drops of chloroform added and poured off, the covering glass placed carefully on, and a few drops of dilute Canada balsam added so as to flow under the cover, which is then placed upon the hot-water plate to dry. Specimens preserved in this manner retain all the freshness of the living animal.—*T. C.*

ZOOLOGY.

JAPANESE DEER.—At a recent meeting of the Zoological Society, the secretary called the attention of the meeting to the herd of Japanese deer (*Cervus sika*) in the park of Viscount Powerscourt, at Powerscourt, in Ireland, now about eighty in number, and gave an account of their introduction and history, from particulars supplied to him by Lord Powerscourt.

FEMALE DEER WITH ANTLERS.—This was the subject of a paper by Mr. Edward R. Alston, read before the Zoological Society, showing that these

weapons are not unfrequently abnormally developed in fertile females of certain species of Capreolus and Cariacus, and giving reasons for believing that in the ancestral forms of deer, they were probably common to both sexes.

The Death of the Manatee.—Mr. Reeves Smith, of the Brighton Aquarium, writes: "Will you allow me to supplement the interesting observations which have already appeared in your contemporaries on the above subject with the following facts? The sirens were formerly no strangers to the shores of Britain, for the near relative of the manatee, the halitherium, occurs as a fossil in the red crag formation of Suffolk. The fossils, though found in the Red Crag of Suffolk, are yet generally considered by geologists as derived from much earlier beds of the Miocene age, which once occupied a large area of what is now the German Ocean, whence they have been washed out and redeposited, on the coast of Suffolk. Similar remains are also found in the miocene of Belgium and Germany. The discovery of the British species formed the subject of a paper by Professor W. H. Flower, F.R.S., Hunterian Professor of the Royal College of Surgeons, and now President of the Zoological Society, published in the quarterly journal of the Geological Society for February (vol. xxx.), in which further details will be found." Two skulls of this fossil Sirenian (called *Halitherium Canhami*) are known, one of which (that described by Professor Flower) is in the Ipswich Museum.

Mistakes made by Instinct.—In answer to J. E. Taylor's suggestion under this heading I send the following instances of mistakes on the part of the humming-bird hawkmoth. While staying at Aigle one summer, I occupied a room hung with a light paper on which dark green diamonds of about an inch square frequently occurred. I observed a humming-bird moth apparently attempt to strike its proboscis into a number of these squares in succession, and as far as I could see choosing the centre of each for its attack. I may mention a similar occurrence which I noticed last winter at Mentone, but in this case the pattern of the paper was wreaths of flowers, but curious to say the moth selected one flower of rather a dark colour, and hovered from one example of it to another without apparently observing the intervening patterns. I may mention that this moth is called in the south of France "good news," as it is supposed to be an omen of future happiness.—*Ebba, Cotford, Sidmouth.*

Zeus Aper, or Boar-fish.— A specimen of this rare visitant of British waters was obtained from a French trawler at Exmouth, on the 19th ultimo. It was caught in the Channel, off the Devonshire coast, and was still alive when brought ashore. Although common in the Mediterranean, Yarrell in his "History of British Fishes" (vol. i. pp. 169–170) mentions only two instances of this fish being caught on the English coast, one in October, 1825, in Mount's Bay, and another (locality of capture not stated) obtained in Bridgewater fish-market in April, 1833. Probably others may have since been captured. The Exmouth specimen measured exactly 5½ inches in length, and corresponded in almost every particular with the excellent description and figure given by Yarrell. No transverse bands, however, were observable on the sides. A lateral line was distinctly visible when the fish was first seen, but in a few days thereafter it had entirely disappeared. The foregoing notes had just been written when another specimen was brought to me this afternoon. It had been caught in the morning in the Channel, about sixteen miles off the coast, and was landed at Budleigh-Salterton. It was nearly an inch longer than the Exmouth specimen, and the transverse bands, although faint, could be distinctly made out. This specimen was forwarded to the Editor of Science-Gossip.—*D. S., Exmouth.*

[We have received one of these specimens of *Zeus aper*, in excellent condition from D. S., and beg to thank him for it very sincerely.—Ed. S.-G.]

Boar-fish (*Zeus aper*).—Six or seven specimens of the boar-fish have been washed on shore here during the last fortnight, only two having been seen before within the last twenty years. I can only account for their appearance by supposing that the prevalence of north-east winds has driven them in from some station in deep water, such as Couch mentions off the Runnel Stone. These same winds have driven on shore still more unusual visitors in the shape of three large vessels, one of them the celebrated American frigate "Constitution."—*Julia Colson, Swanage, Dorset.*

Marine Zoology.—I feel certain that much valuable information in reference to marine dredging might accrue if the various readers of Science-Gossip would give their local knowledge and experience for the benefit of other naturalists. Dredging, as a rule, is not successful, unless the locality is thoroughly well known and familiar; indeed, at many places along our coast, if the dredge is not placed over the exact spot, the haul would be profitless in its results. Whilst on a dredging cruise last year, I always made notes of those places where the dredge had been used, so that at any future time I could return to the same locality. I did this by roughly marking the position on the chart, and where it was possible I made use of land marks, such as, for instance, a church or a windmill in a line with a large tree bearing N.E. A side mark, or, technically speaking, a thwart-mark was then noted, such as the headland just clearing the light-house; this object should be at a right angle to the first observation, or as much so as is practicable. In returning to the same position,

it is only necessary to sail until the two lines cross each other. As I hope shortly to commence dredging operations, visiting Weymouth, Torquay, Plymouth, Falmouth, Penzance, and the Irish Channel, any information relative to the dredging of these places, would be to me of great service.—*C. P. Ogilvie, Leiston, Suffolk.*

"THE POPULAR SCIENCE REVIEW."—The last number of this excellently edited and old-established quarterly journal is a capital one. It contains articles on "The Sources and Uses of Iron Pyrites," by J. A. Phillips, F.G.S.; on "The Evolution of the Elements," by M. M. Pattison Muir, M.A.; "The Structure and Origin of Limestones," by H. C. Sorby, F.R.S.; "The Supposed New Crater in the Moon," by E. Neison, F.R.A.S.; "Entomology," by the Editor (W. S. Dallas, F.L.S.); "The Collapse of the Electric Light," by W. H. Stone; "The Feræ Naturæ of the London Parks," by J. E. Harting; &c.

NOTES ON THE COLOUR, AND ON MOUNTING "NOCTILUCA MILIARIS."—It is well known that to the *Noctiluca miliaris*, the phosphorescence of the sea is due, at all events, in our own temperate waters. Now, although like many of my brother naturalists, I occasionally go to the sea-side, on botanical and zoological thoughts intent, yet, strange to say, I never saw the phenomenon until last summer, and have always thought that the descriptions I have read in books have been very much overdrawn. For instance, in "Le Monde de la Mer," by Mons. Moquin-Tandon, there is a particularly graphic description. It must be confessed that this account is very much like the phenomenon in one particular, it is both luminous and glowing; but at the same time it is accurate. Myself and Dr. Worrall had been in a yacht to a place some miles from Bangor, North Wales, for zoological purposes. It was evening before we returned, as the tide was against us, and the wind, which had favoured us going, had at last utterly failed us. The sea was placid, and it was when we had fairly got into Beaumaris Bay, that the full beauty of the phenomenon was apparent. The description was, as far as we could test it, true to nature. We collected in vials numbers of the little Noctilucæ for examination when we arrived at home (the hotel). When we had pretty well exhausted its points of interest, we set about mounting some for future examination. We mounted them in shallow cells, with various preservative media, that we might compare the results. We tried balsam, glycerine, water (marine and fresh), glycerine jelly, Dean's medium, and several others. One or two of the slides rapidly deteroriated, others held out for a longer period, but the specimens mounted in sea-water, retained all their freshness to this date. As the animals retain their shape, it would appear that there has been no endosmose or exosmose action going on. The morning following our excursion, our boatman (himself a collector) brought us a two-quart bottle rather more than half-full of a red-lead, or rather orange-lead coloured substance which he called spawn of some kind, and he had brought it to us for microscopical examination. On placing a small portion under the microscope, we found it to consist solely of dead Noctilucæ. Shortly afterwards we took a stroll along the shore, accompanied by our friend the boatman, and he showed us all along the shore an orange-red line consisting of the dead bodies of the Noctilucæ, just as they had been left by the receding tide. Having seen no account of the animal possessing colour, I thought it might interest the readers of SCIENCE-GOSSIP to be made acquainted with this peculiar fact.—*John E. Lord, Rawtenstall.*

BOTANY.

TERATOLOGICAL NOTES.—Noticing in your late numbers various accounts of malformation of plants and flowers accompanied by sketches, I am induced to trouble you upon the subject. With regard to the sketch of a "monstrous calceolaria," in your February number, it is of the most common occurrence, especially in the "Prince of Orange" variety, as I have had year by year many identically similar malformed flowers, both in the red and yellow varieties, blooming in my garden, but have noticed that the plant producing them, although apparently vigorous, soon withered and died. I send you with this communication a synanthic cyclamen, which I believe to be very unusual, but this also is the produce of a weakly-grown bulb. May not these abortions be traced rather to a last effort of expiring nature than to any variations of soil or climate, just as dying fruit trees often pour forth an abundant bloom which never matures, and the tree shortly dies?—*J. I.*

RARE SPECIES FOUND IN JERSEY.—I found *Diotis maritima* and *Centaurea paniculata* in large quantities on the hillside at St. Ouen's Bay, Jersey, during the past season. I thought our readers would like to know that they still exist in their old localities.—*W. H. Jones.*

ECHIUM ANGLICUM (RAY).—Upon looking over an old edition of Hudson's "Flora Anglica" I saw this species described, also there are a few notes upon it, made by myself from actual specimens, collected in 1871 at Homer, Shropshire. It is evidently first described by Ray (vide Synopsis, p. 35), so that it is not a species made to-day upon insufficient grounds. Hudson ("Flora Anglica," ed. 1762), has three species, distinguished as follows:

1. *E. vulgare*, caule simplici erecto, foliis caulinis lanceolatis hispidis, floribus spicatis, *staminibus corollam æquantibus.* Viper's Bugloss.

2. *E. anglicum: Staminibus corolla longioribus.* English Viper's Bugloss.

3. *E. italicum: Corollis subæqualibus vix calycem excedentibus*, margine villosis. Wall Viper's Bugloss.

The habitat of No. 1 is in fields frequent; No. 2, pasture fields and waysides frequent; No. 3, Jersey. We think it a pity this species should be lost sight of, not that we believe the character, depending alone upon the length of the stamens, is very valuable as a specific distinction. But the Homer examples have a widely different habit. Stem procumbent at the base, the leaves are linear, and with a soft pubescence, and the petals are not more than half the size of No. 1. Stamens always exserted.

NOTE.—This species (English Viper's Bugloss) occurs frequently, both in Staffordshire and Shropshire. In the above year we could easily detect it from *E. vulgare;* when riding along the highways we could with ease tell the difference. Would our readers give it their attention, during the coming season, and let us know the result? for it is not pleasant for a species bearing such an honoured name, to be overlooked.

SALICORNIA.—Hudson, again following his earnest predecessor Ray, makes out five distinct forms from *S. herbacea;* probably they are merely varieties of a lax type; however, we mention them to invite the study of our enthusiastic amateurs. It requires a little courage to face mud flats on the banks of our tidal rivers—this may partly account for our limited knowledge of these plants. We shall again shortly refer to, and describe the forms in our herbarium.

UNIVERSITY COLLEGE, LONDON: LADIES' BOTANY CLASS.—The Rev. George Henslow, M.A., F.L.S., &c., lecturer on botany to St. Bartholomew's Hospital, is about to deliver a course of twenty lectures on botany to ladies. We are glad the authorities have been so public-spirited as to throw their classes open to women as well as men.

GEOLOGY.

CARBONIFEROUS FENESTELLIDÆ.—On Feb. 26, Mr. G. W. Shrubsole read before the Geological Society an important paper, entitled "A Review of the British Carboniferous Fenestellidae," and all who have made any attempt to determine species of Fenestella must have felt how much a revision was required, and in what an unsatisfactory state our knowledge of the Fenestellæ has been. That Mr. Shrubsole should reduce the number of species very materially was only what those acquainted with the subject would expect, and who would not be much surprised at his reducing the nineteen so-called species which have come under his notice to five.

Mr. Shrubsole has had splendid material to work at from Halkin mountain in Flintshire, and in this locality he has seen a specimen of *Fenestella plebeia* having a circumference of two feet, and this shows that the variations of different parts of the colony are very great, so that "the young, the mature, and aged condition of the same Polyzoan have been described as distinct species; a similar honour being sometimes conferred upon the base and the upper growth." In the paper it is maintained that the true type is Actinosoma, which has eight denticles set round the margin of the aperture. This structure however seems only to have been as yet discovered on three species, and we shall look forward to future papers from the same author, to explain how far he would hold this to be the case; for Polypora and Glauconome must certainly be considered as belonging to the Fenestellidæ, even if they may not have in part to be united in the genus, and the covers already pointed out by Professor and Mr. Young as covering the aperture of Polypora and the tuberculated margins of *Glauconome flexicarinata* make it difficult to understand how these cells, at any rate, could have had raised peristomes with denticles like Actinosoma. We may add that though there is so much resemblance to the bryozoa, or polyzoa, yet that their connection with more recent forms has never been worked out; and that although there are some points of affinity with Cheilostomata and some with Cyclostomata, proofs as to their exact position are yet wanting, and we may therefore be allowed to point out to Mr. Shrubsole, that if he can bring forward any points of shell structure, to elucidate the question, he will be adding much to the great importance of this first communication.

THE RAINFALL OF THE WORLD.—This is the title of a pamphlet by Mr. E. D. Archibald, in which an ingenious attempt is made to simplify the general question of a connection between sun-spots and rainfall; and in it our readers will find a full statement of the supposed relation between famines and sun-spots.

THE GEOLOGISTS' ASSOCIATION.—We have received Nos. 7 and 8 of the Proceedings of this vigorous society, in which Mr. W. H. Hudleston continues his invaluable papers on the Yorkshire oolites.

THE POST-TERTIARY DEPOSITS OF CAMBRIDGESHIRE.—This was the subject of the Sedgwick Prize Essay for 1876, and was awarded to Mr. A. J. Jukes Browne, B.A., F.G.S. It is now published by Deighton, Bell, & Co., of Cambridge, at half-a-crown. As might be expected from Mr. Jukes Browne's known repute as a writer and geologist, it is a most ably-written and attractive essay on the subject, presenting us with an account of the physical features of the county, and a description of the glacial deposits, the hill-gravels, the valley-gravels of the early river system and of the present river system; and also a general correlation of the drift beds of Cambridgeshire with those of East Anglia.

THE LATE PROFESSOR DAVID PAGE.—We regret to have to announce the death of this well-known geologist, on Sunday, March 9, at the age of sixty-five. Although not distinguished for discoveries in the field, few men have done more to make English geology so popular and extensively studied as Professor Page did by the numerous admirable books of which he was the author, and many readers will hear of his death with unfeigned regret.

THE GEOLOGY OF NORTHUMBERLAND.—Professor G. A. Lebour, of the Newcastle College of Physical Science, has just published a neatly got up *brochure* having the above title. It was intended originally for use in his own geological class, but there cannot be a doubt that it admirably fills a want, for we know of no trustworthy description of the geology of that part of England. The glacial beds are especially interesting, and the Permian, Carboniferous, Silurian, and Igneous rocks frequently occur under peculiar circumstances. On all these Mr. Lebour has written in a style at once accurate and readable. The book may be obtained of H. Sotheran & Co., 78 Queen Street, London, E.C.

CONODONTS FROM CAMBRO-SILURIAN, AND DEVONIAN STRATA IN CANADA AND THE UNITED STATES.—A paper on this subject was recently read before the Geological Society, by Mr. G. Jennings Hinde, F.G.S. After a sketch of the bibliography of the subject, the author described the occurrence of Conodonts. In the Chazy beds they are associated with numerous Leperditiæ, some Trilobites, and Gasteropods; in the Cincinnati group with various fossils; and in the Devonian strata principally with fish-remains: but there is no clue to their nature from these associated fossils. They possess the same microscopic lamellar structure as the Russian Conodonts described by Pander. The various affinities exhibited by the fossil Conodonts were discussed; and the author is of opinion that though they most resemble the teeth of Myxinoid fishes, their true zoological relationship is very uncertain.

ANNELID JAWS FROM THE CAMBRO-SILURIAN, SILURIAN, AND DEVONIAN FORMATIONS IN CANADA, AND FROM THE LOWER CARBONIFEROUS IN SCOTLAND.—This was another paper read by the same author. After referring to the very few recorded instances of the discovery of any portions of the organisms of errant Annelids, as distinct from their trails and impressions in the rocks, Mr. Hinde noticed the characters of the strata, principally shallow-water deposits, in which the Annelid jaws described by him are embedded. A description was given of the principal varieties of form, and of the structure of the jaws. They were classified from their resemblances to existing forms under seven genera, five of which are included in the family Eunicea, one in the family Lycoridea, and one among the Glycerea. The author enumerated fifty-five different forms, the greater proportion of which are from the Cincinnati group.

GEOLOGY OF ESSEX, &c.—We have received one of the "Memoirs of the Geological Survey," giving an explanation of sheet 27 of the one-inch map of the Survey of England and Wales. It deals with the Geology of the north-west part of Essex and the north-east part of Herts; with parts of Cambridgeshire and Suffolk. The survey is under the direction of Mr. W. Whitaker, with whom are associated Messrs. W. H. Penning, W. H. Dalton, and F. J. Bennett. Not one word of commendation on our part is needed to introduce this *brochure* to our readers, but we are glad to call attention to its issue, nevertheless.

NOTES AND QUERIES.

INTELLIGENCE IN MAN AND ANIMALS.—Your correspondent, Mr. H. D. Barclay, in the January number very truly and properly remarked that "the great difficulty in the investigation of the minds of animals appears to be that man, instinctively and unconsciously, unless checked by reflection, explains their actions by his own modes and laws of thought." This appears to me to contain the whole gist and difficulty of the subject, if he means, as I understand it, that the unguided impulse of man is to draw instant conclusions (if I may say so) of the cause of actions in animals by analogy to the cause which would have actuated him under like circumstances. If it could be proved that we were justified in so concluding, the hypothesis that instinct and reason are different only in degree would be sufficiently substantiated, but as yet nothing worth the name of proof has been offered, and I believe it to be incapable of proof for the simple reason that the opposite proposition, viz. that we cannot judge by such analogy, is abundantly proved to every one having the most rudimentary knowledge of the actions of animals. We know that animals can and do do highly "reasonable" things intuitively and without reason and reflection, and that it is necessary to the order of their existence, but the very opposite of this holds good with reference to man; he cannot do reasonably anything without reasoning and reflection, and these faculties are just as necessary in him to the order of his existence, as they are unnecessary in animals to the order of theirs.

Take for instance such actions of animals, as birds building their nests, young birds opening their mouths to be fed, the admirable way in which they keep their nests clean, the hen warning her chicks of the presence of the hawk, the chicks flying to their mother for protection, young ducks taking to water, &c. These instances are sufficient to effectually negative the proposition that we are to judge of the actions of animals by analogy with the same laws that govern the actions of man. If not, where is the analogy in these cases, and if in these cases we cannot so judge why are we to do so in others? Or, in other words, if we are to judge of some of the actions of animals by the law of pure instinct as differing in kind from reason, where are we to commence to judge of them by a law of instinct not so differing; or again, the above instances proving, as I believe they do, that there is an instinct differing in kind from reason, are we to believe that animals are

endowed with both faculties, whilst we know man is not; and again, if the difference is only in degree, how is it that as animals have been born in the higher degree, i.e. with power to act "reasonably" from the beginning of their birth, and thus having an immense advantage over man at the starting of life, they are so immensely inferior to man, who in comparison is born into the lowest degree? Taking the difference as being in degree, then comparing man with monkey, the highest degree is in the monkey. The uncultured man is shown by Darwin's savage to have less reason than the uncultured monkey; this theory therefore would compel us to trace the degree in man *downward* from the monkey, though this is hardly in conformity with the theory of evolution.

As it is capable of proof that animals can act intuitively with sufficient apparent "reason" for their wants, and, as compared with man, are incapable of tuition, and that man cannot act at all intuitively, but, as compared with animals, is capable of tuition to an unlimited degree, it appears to me to be a fair deduction that the respective powers of "reason" as actuating man and animals are of so totally different a nature as to be no more the same in kind than a man is a species of duck because he can learn to swim.

The incident of Darwin looking with abhorrence on the savage of Tierra del Fuego, and comparing him (the savage) unfavourably to a monkey, rather than being a proof of the sameness of mind and instinct, is a good illustration of the difference of those faculties. Look on this picture: Darwin, a man, born with no instinct, as far beyond the monkey (who was born a thousand times cleverer than he was) as the stars from the earth. Then look on that: the savage, a man beneath the monkey, simply because he was born without instinct, but with a mind, which from degradation of his race he had not exercised. But he bears every impress of the aptitude and attributes of man, and as to mind, only differs in degree from Darwin. Compare them, and then compare the savage and the monkey, and then see if we cannot get a true perception of what constitutes a difference in degree and in kind; if not, let us imagine a young savage and a young monkey put through a course of instruction, say in arithmetic, it would be an interesting study to watch which would learn the "tables" first; but I would back the savage. Yet, if we are to take the inferiority of state of the particular savage which Darwin looked on, as an instance of reason being of the same nature as the instinct of monkey, I should be backing at long odds.—*Robert S. Gilliard.*

INTELLIGENCE IN MAN AND ANIMALS.—I should like to make a few remarks on the above subject in reply to some of your correspondents, if you can afford me the necessary space. Mr. Barclay in his first communication, says: "If it could be proved that a dog deliberately chose one of two courses of action, the case of reason would be established." Now it seems to me that in their every-day actions, animals frequently choose one of two courses of action. For instance, if a cat is left alone in a room with a bird, its natural instinct would impel it to kill the bird and eat it, but it has rëason enough to know that such a course of action would be followed by a certain punishment, the fear of which deters it from doing that which mere instinct would certainly prompt it to do. A dog knows very well when it has done wrong, and the old saying "Like a dog with his tail between his legs" is a very expressive one. It may, perhaps, be said, that the animal is simply restrained from doing a certain action by the fear of consequences. Is it not so with man? What would become of our boasted morality, the rights of property, &c., were it not for the fear of consequences, here or hereafter? Mr. Barclay admits that animals possess what are called moral qualities in man, but denies to the unfortunate brute any praise for their possession, as they are simply a part of its nature, "primal impulses." If such be the case, how can the difference in the disposition of animals be accounted for? Some animals are born without those "moral qualities of fidelity, attachment, and courage," which, when found in the lower animals, Mr. Barclay designates "primal impulses," and seem to be actuated simply by an unconquerable animosity to mankind in general. I do not quite understand your correspondent, Mr. P. Q. Keegan, when he says: "that memory is an act of the intellect, but certainly not an act of reasoning in the sense of inferring one proposition from another." Memory is the power reason has of retaining and arranging facts which come under our observation, so that they may be used when required, but I certainly do not see how memory could possibly exist without reason, or reason without memory. Mr. Barclay admits that animals have some intelligence and memory, but questions their power of reasoning, which he says is the root of man's civilisation, and makes him a responsible being. Alas! that the power should be so perverted as it sometimes is! Has Mr. Barclay forgotten that there are various races of mankind, and that all are not quite so highly civilised as we are in this favoured country? Again, Mr. Barclay says: "Those who credit the lower animals with reason, if they are consistent, will also credit them with conscience." Why should they not be credited with conscience? As I have said before, most domesticated animals know very well when they have done wrong, and prepare to suffer for it, just as a naughty child would do. In conclusion Mr. Barclay says: "Take from man his reasoning power, latent though it may be in many cases, yet underlying all his conceptions, and we find the idiot who would perish but for extraneous aid. Take from the quadruped the modicum of reason which Mr. Darwin and others of his school attribute to it, and we have an animal endowed with some kind of intelligence we do not understand, but name instinct." Of course, just as the feeling of cold is produced by the absence of heat, so if you take away a man's reasoning power, you leave him a helpless idiot, without even instinct, and if you take away the modicum of reason from the quadruped (which Mr. Barclay denies it) you leave what may be called simple instinct. Mr. Barclay seems to contradict himself in his last sentence. The remarks of your correspondents A. Wheatley and C. L. W. are very good, and much to the point, but "Idea" seems to take a poetical rather than a scientific view of the subject under discussion. The idea that animals really possess something more than mere instinct, and are deserving of more consideration than they generally receive, is certainly gaining ground amongst the thinking portion of the community, and to use the words of Mr. P. Q. Keegan, is seriously entertained "by men of the highest culture and sanity."—*A. C. Rogers, Southampton.*

INTELLIGENCE IN MAN AND ANIMALS.—Allow me to correct two slight errors in my note in your April issue. After the word "effect," the colon should be changed to a full stop, as the words "to this effect" refer to the "supernatural change" previously mentioned. Also "Lopinard" should be "Topinard." Your correspondent, Mr. Barclay, says that the nature of the lower animals obviously differed from ours. But this is not certain, excepting that ours is perhaps more perfect. Animals show joy, fear, hunger, pain, will, choose larger of two pieces

of food, &c. These are also parts of our nature; we have not the privilege of folly even; nor of language, for animals certainly have some kind of language of their own. I will however return to this point afterwards. Even morals are but the rules of society adopted by certain people, and are not everywhere the same. But "le chien sait que pour ne pas être mordu il ne doit pas mordre, et agit en conséquence; il a aussi sa morale" (Topinard). Now in the above and similar cases, if our actions are supposed to result from reason, why not those of animals? The effects in animals are much the same as in ourselves, why not the causes? If in similar actions in each case, we adjudge reason to be exercised in ourselves, we cannot, I think, consistently deny such power to animals. Again, Mr. Barclay says that if we take from man his reason, we leave him an idiot, but if we take from the quadruped the modicum of reason attributed to it, we leave it endowed with the same intelligence, which we do not understand but call instinct. Now memory cannot be called instinct. If we take memory from man we certainly detract from his intellect; if we take it from animals do not we lower their intellectual powers also? Some savage tribes have very little intellect; there are some who cannot count more than two, while a magpie has been known to count three. I do not mean merely to repeat the numbers, but to understand them. Monkeys will organise bands, appoint sentinels, listen to speeches from their leaders for a very long time, and have been found to execute, occasionally, careless sentinels; is there no reason about this? It is absolutely necessary to keep poetry, sentiment, &c. out of such questions as this, and to reason merely from known facts. It is often supposed that man alone had reasoning power given to him, and it may be very pleasing to our vanity to think so. The older naturalists imagined that man and animals were totally different, but has it not been shown that they are really only different branches of the animal creation? Philology may throw some light on this question. It is usually admitted by philologists that man invented language. Now, beyond all doubt, the earliest languages were very rudimentary and imperfect, consisting of mere ejaculations. The great reasoning power of men of the present time is in part due to language, a medium in which to think. But when language was so imperfect, thought must also have been rudimentary. Now is it beyond probability that the first inventors of articulate speech had not much more reasoning power than that shown by apes? Apes have the vocal organs of man, but have not yet learned to use them as we have. Consequently one of the greatest aids to thought is undeveloped in them. It has only arrived at its present state of perfection in man during many thousands of years.—*A. Wheatley.*

INTELLIGENCE IN ANIMALS.—When I was a young man I lived in chambers on the ground floor of No. 1, King's Bench Walk. As the ante-room was dark, glass had been let into the upper part of the front door. This made it necessary to place the knocker lower than is usual. A fine tom-cat was my constant companion. As a knock at the door was a very welcome sound to me, from the hope it excited of a possible client, I was very prompt in answering the summons, for I had not then a clerk. My cat had thus the opportunity of observing (whether he did so in fact is of course the question) that the opening of the door immediately followed as a consequence on the agitation of the knocker. Certain it is that tom on returning from his nocturnal rambles would stand on his hind legs and with his fore paws raise the knocker and produce as decided a succession of raps as a human being could have given. I was generally in bed when this occurred and was often unwilling to get up to let the truant in. If I remained long obdurate he would go round by Whitefriars (how he left the Temple I do not know, as the high gates were closed) and passing down a lane would climb a wall into a garden. By this circuitous and difficult route he obtained access to my bedroom window. There he would make such a mewing and scratching on the glass that I was compelled for peace' sake to rise and admit him. I am afraid that I did not always receive him with the welcome which his intelligence and perseverance deserved, but we were soon good friends again, and it was with great regret that I found on my return from a long vacation trip that my cat had disappeared. It must be admitted that the behaviour of the animal was as if he had reasoned thus. "My master does not hear the knocking because he is in bed; I must therefore go round and rouse him by making a noise at his window." Some years ago I told this story to a very eminent judge. With a twinkle in his eye he said, "I also had a remarkable cat, she would sit on my table as I read my briefs and play with the paper, and when my eye approached the bottom of a page I could almost fancy that she tried to turn it over for me with her paw." This satire on my story and the inference I was disposed to draw from it, has made me hesitate to tell the anecdote except to a sympathising audience, but as you are receiving contributions to the subject of intelligence in animals, I think it due to the cats to put it on record in your columns, as one for the exact truth of which I am willing to be responsible; with this object I give my name.—*James Hannen.*

INTELLIGENCE IN THE DOG.—I have read various notes under the head of "Intelligence in Animals," which have appeared in SCIENCE-GOSSIP, and am induced to jot down a few particulars respecting a sheep-dog of mine, leaving your readers to determine the motive power that influences the animal, for I will not offer an opinion as to whether instinct or reason guides him. He is very fond of a long walk, and when I first came to live here used to accompany me to the post office, but the distance being trifling, he soon refused to go with me whenever he saw any letters or papers in my hand, and it is quite sufficient now to say, "I am going to the post," to prevent his showing any desire to accompany me when I leave the house. He goes every morning into the lower end of the village with an elderly gentleman to fetch the daily papers, and having discovered that a young lady, a friend of mine, takes her morning's walk about eleven; he now returns from the village, leaving Mr. B. at the stationer's in time to meet Miss R., thus securing for himself two walks. He never tries to accompany any of the family who are going to church; it is quite sufficient to say "Sunday," or "church" (he was once turned out of church); but if I am at home, and happen to go for a walk during the hours of service, his delight is excessive. He barks invariably as we pass the church.—I cannot break him of the habit—as if to say to the others who are in church: "I am going out, though you would not let me come with you." He sleeps in an unused coach-house, is fed once in twenty-four hours. When he is locked-up for the night, all the larger bones which he is unable to eat, he, after picking clean, carries off to a corner of the building far away from his bed and lays in a tidy heap.—*Mrs. Alfred Watney.*

PRIDE OF A COW.—It is tolerably well known that when milch cows kept on a farm are being driven out to grass, and when brought home to milk,

the oldest cow always places herself at the head of the herd, and so on, according to their ages, when the youngest comes last. But I think it will rarely occur that this assertion of pre-eminence over the herd is ever carried to such an extent as appears in the following instance. A person states that when on a visit to a country house where cows are kept, it one day happened that he was passing the cow-house just at the time when the dairymaid was driving home the cows to be milked. They all passed in quietly enough, with the exception of one, which stood lowing at the door, and resisted every effort of the dairymaid to induce her to enter. When the maid was interrogated as to the cause of this obstinacy, she attributed it to pride; and when surprise was expressed at this, she explained that whenever any other of the cows happened to get in before her, this particular cow would seem quite offended, and would not enter at all, unless all the others were turned out again, and she had an opportunity of walking in before them. This statement having excited curiosity, and a wish to ascertain its accuracy, the maid was desired to redouble her exertions to induce the cow to enter; on which she chased the animal through every corner of the yard, but without success, until she at last desisted for want of breath, declaring there was no other remedy than to turn out the other cows. She was then permitted to make the experiment; and no sooner were the others driven out, than in walked the gratified cow, with a stately air, her more humble-minded companions following meekly in her train.—*Dipton Burn.*

LABURNUM IN AUTUMN.—There are several laburnums here which exhibit the peculiarity mentioned by W. G. I am not botanist enough to say whether they differ from the ordinary variety, but do not think so, as they exhibit no other mark of difference. The second flowering occurs every year in the autumn.—*J. Forbes Mitchell, Thainstow, N.B.*

LABURNUM IN AUTUMN.—I noticed that the flower pendants of the laburnum blossoming in September were smaller than usual, and it may probably have been the variety referred to by your correspondent.—*R. H. Nisbett Browne.*

QUERY AS TO FLOWER.—It seems obvious that in the lines from "Venus and Adonis," referred to by Mr. J. Wheldon, jun., the poet had in his mind the mythological story concerning the death of Adonis. Cynaras juvenis (Adonis) having died from a wound received from a boar, the flower anemone sprang from his blood. It is not likely that Shakespeare here refers to any other flower. Buchanan, in his "Dictionary of Science and Technical Terms," points to *Adonis autumnalis* as the plant deriving its name from Adonis. This plant being of the same order (Ranunculaceæ) and somewhat resembling the anemone, might have easily been called in common with it.—*Charles F. W. T. Williams, Bath.*

QUERY ABOUT FLOWER.—In Bell's edition of Cowley's Poems (1778), book iii. of Plants, p. 147, stanza 610, the purple anemone is spoken of as the flower stained by the blood of Adonis.

> "Anemone her station took
> * * * * *
> The purple, with its large and spreading leaf,
> Was chosen, by consent, to be their chief;
> Of fair Adonis' blood undoubted strain,
> And to this hour it shows the dying stain."

I have also seen this legend mentioned in another book.—*F. L. St. A.*

QUERY AS TO FLOWER.—Mr. J. W. Wheldon, jun., asks what flower does Shakespeare refer to in the closing stanzas of "Venus and Adonis."

> "A purple flower sprung up, chequered with white."

I think he means the Pansy, and if he will refer to "A Midsummer Night's Dream," and read the exquisite passage descriptive of Love in Idleness, beginning,

> "I remember
> That very time I said, but thou couldst not,"

he will see the reason for my opinion. In Singer's "Shakespeare," the editor says in a footnote, "The tricoloured violet, commonly called pansy, or hearts-ease, is here meant." It has other fanciful and expressive names, such as "Cuddle me to you," "Three faces under a hood," "Herb Trinity," &c. Is there a description in all literature that can compare with this of a simple flower?—*H. D. Barclay.*

QUERY AS TO FLOWER.—With refence to Mr. Wheldon's query as to Flower, I would remark that anemone is supposed to be the name of the flower as the one into which Venus was said to have changed Adonis. See Ovid. Metamorph. l. 10, p. 735; but classical authorities might here render some solution. There is *Anemone Pulsatilla*, or Pasque Flower, with fine purple flowers—and other species of Adonis, all belonging to the Ranunculus family—these latter have, according to Mr. Bentham, mostly red or straw-coloured flowers; then the pheasant's-eye comes under this head; the same author states that a variety was formerly much cultivated in gardens under the name of *Flos Adonis.* During a residence of some weeks in Rome in the spring of 1865, I noticed thousands of anemones with red flowers in the extensive grounds of the nobility, forming a carpet of scarlet colours. Dean Stanley in his work on "Sinai and Palestine," writes, "that in the spring the hills and valleys of Palestine are covered with thin grass and aromatic shrubs which clothe, more or less, all Syria; they also glow with a blaze of scarlet, of all kinds, chiefly anemones. Of all the ordinary aspects of the country, he writes, the blaze of scarlet colour is perhaps the most peculiar, and to those who first enter the Holy Land it is no wonder that it has suggested the touching and significant name of "the Saviour's blood drops."—*John Colebrooke.*

"HONEY-STALKS?"—In Shakespeare's "Titus Andronicus" occur the words:

> "Words more sweet, and yet more dangerous,
> Than baits to fish, or honey-stalks to sheep."

Query, what are "honey stalks?" Perhaps some of your readers may be able to inform me.—*C. Foran.*

DOGS AFFECTED BY THE SOUND OF MUSIC.—What is the explanation of the curious effect that music (played upon a piano, &c.), has upon some dogs? I have a skye terrier about four months old, who, when the piano is played, seems to be curiously fascinated by the sound, and comes towards it, but then howls in a most plaintive way with his nose in the air, as if protesting against the sound.—*W. Stavenhagen Jones.*

COSSUS AT SUGAR.—In the month of September, 1877, while at Somersham (Hants) a specimen of *Cossus ligniperda* came to sugar. It rather surprised me, as I thought this species did not come to sugar. If any reader of SCIENCE-GOSSIP can answer this for me, I shall be much obliged.—*W. H. Newberry.*

FEEDING BULLFINCHES WITH HEMPSEED (p. 66).—Having had several of these birds in keeping, I am able to testify that hempseed has no very notable effect in darkening the plumage, nor does it appear to shorten their lives, as has also been insinuated; not that it is advisable to confine them solely to hempseed, I have generally mixed equal proportions of crushed hempseed and canary-seed, adding each day a little millet or maw-seed. Rape would probably be unwholesome to them. It is difficult to break them from the hempseed if they have once been allowed to have it as part of their diet, I have seen them pine under such an attempt. As the bullfinch is naturally rather a greedy bird, it is well to check caged birds if inclined to over-feed, especially when green food cannot be got as a corrective.—*J. R. S. C.*

PARROTS AND THEIR EGGS.—I have been advised to write and tell you of a very interesting and uncommon occurrence. My old parrot was bought at Norwich in the year 1872; I believe she was then three or four years old. She was quite ill last week, and thinking she was moulting I kept her very warm, and when I left the room I covered her cage over; on my return from church last Friday morning, I found an egg in the cage; still she did not get better, and yesterday morning another was laid. The bird-fanciers assure me it was a very rare occurrence for two eggs to be thus laid, and that it ought to be put on record.—*E. J. B. W.*

YEW-TREES AND CATTLE.—With reference to the remarks in the March number of SCIENCE-GOSSIP as to the injurious effects of the foliage of the yew-tree on cattle, the following extract from the "Globe" of March 21 may be interesting: "Eighteen valuable beasts have died at Willingdon, near Eastbourne, in consequence of eating branches of yew-tree, probably through scarcity of ordinary green food."—*E. Lovett, Croydon.*

GOSSAMER.—A gentleman, a farmer in this neighbourhood, told me that while coursing last week he saw several fields of wheat and sainfoin that were smothered with gossamer. I myself saw a good deal floating about in the town, and noticed that instead of the clotted appearance it assumes in the autumn, it was in long fine threads. Would you kindly tell whether this is a usual occurrence in spring, and the cause?—*Arthur G. Wright.*

THE NAME "PRIMROSE."—The editor of a scholastic journal has recently stated, in answer to a query, that the word "primrose" is a corruption of *primerolle*, a French word, introduced by our early authors. I should be glad to know if this is probable, for I have heard also the assertion that our forefathers called this flower of spring the "prime-rosy," because it was one of the first to appear in the season, "rose" being by them used with some latitude, and applied to various flowers besides the rose proper.—*J. R. S. C.*

CAN WORMS CRAWL BACKWARDS?—Mr. J. G. Wood, in a recent article on the common earthworm written in a popular periodical, states that the worm is so formed that it is impossible for it to crawl backwards. I am sorry to contradict so distinguished a naturalist, but scientific facts do not bend to great names, and I beg to say that worms *can* and *do* crawl backwards. It is an unusual method of progression or retrogression I allow, and is not to be confounded with the sudden jerk by which they start backwards into their holes, but that worms can strictly and literally crawl backwards when excited by circumstances so to do, I have had ocular demonstration on two particular occasions—once when attempting to induce a large worm to crawl into a small glass tube, which I persistently placed just in front of it when it began to crawl; irritated apparently by a foreign substance being so frequently brought into contact with its attenuated head, all at once the worm began to crawl backward on the ground for a space of four or five feet and at a rate equal to about two-thirds of its ordinary forward pace when progressing. On another occasion I was attempting to make a worm crawl along a path in order to calculate the time-rate at which a worm can crawl in a mile. The worm persistently attempted to crawl to the side grass instead of along the path and to prevent it I continually touched its head with a little stick, when this worm also apparently annoyed by such constant tappings on its head, began to crawl backwards a short distance on the path. Perhaps some of your readers can confirm this statement.—*W. Budden, Ipswich.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

D. B. (Dudley).—It is very difficult to speak only from leaves, they are so much alike, but we believe it is a *Musa*, perhaps *M. sapientum.* Berkeley's 'Cryptogamic Botany' is published by H. Bailliere, 219, Regent Street, London.

T. O. BRAITHWAITE.—We do not remember receiving the larvæ of which you speak. Can you send us other specimens?

W. A. DURNFORD (Barrow).—You will find full details as to aquarium management, and the manufacture of artificial sea-water in "The Aquarium: its history, structure, and management," by J. E. Taylor. London: Hardwicke & Bogue, price 6*s*.

E. B. DE M.—See reply concerning marine aquaria above. We have no doubt you can get materials for making artificial sea-water, gravity-beads, &c., at Mr. King's, Sea Horse House, Portland Road, London.

W. E. MILNER.—The last edition of White's "Selborne," in 2 vols., edited by Professor Bell, who lives in White's old house, is by far the best yet issued.

A. BENNETT.—We believe yours is the only parcel which got wrong out of all our Botanical Exchange Club deliveries. We will see that you are righted.

M. H. ROBSON.—We do not remember having seen the flagellum of *Euglena viridis* terminating in a bulb before. The specimens you sent reached us alive, and we observed that the bulb was used occasionally as a kind of sucker against the glass sides of the zoophyte trough.

E. DICKSON.—One of the best books we can recommend to you is Penning's "Field Geology," published by Baillière, at (we believe) 5*s*. We are afraid there is no other way of naming your fossils than by comparing them with some museum specimens, or else borrowing the volumes of the Palæontographical Society, or such works as Professor Phillips' "Geology of Yorkshire."

T. G. H.—See reply to query as to the nature of the specks on the Seville oranges in April number of SCIENCE-GOSSIP under Notices to Correspondents, p. 95, in answer to "G. R. B. (Shoreham)." Get Oliver's "Botany," published by Macmillan, at 4*s*. 6*d*., and work well at it. All will come right. Thanks for your interesting specimens.

W. G. (Tuxford).—The specimens sent are all sulphate of barytes, or "heavy spar." Get Rutley's "Study of Rocks," price 4*s*. 6*d*.

GEORGE HASTWELL.—The fungus is *Peziza acetabulum.* We have carefully examined your fossil from the Millstone Grit, but do not think it is an organic remain, but possibly one of the numerous surface-markings we often get in beds deposited in shallow water.

J. M. CAMPBELL.—Your zoophyte is *Sertularia operculata.*

GEORGE TURVILL.—We have received the slide. The specimen mounted is the flea of the mole, the largest known to affect any animal in Great Britain. Its name is *Pulex talpa*, derived from the animal on which it is parasitic.

GEORGE LINTON.—Your specimen is an echinoderm, shorn of its spines, known as the common heart urchin (*Amphidotus cordatus*).

EXCHANGES.

WELL-MOUNTED slides of pigeon despatch, used during the siege of Paris, in exchange for two slides of interest, also well-mounted.—L. Hawkins, Hillside, Hastings.

WANTED, good slides, in exchange for well-mounted slides of "Challenger" sounding.—H. R. 85 Worcester Street, Higher Broughton, Manchester.

WANTED, the second volume of 'Recreative Science.' Any one having a copy for disposal will oblige by addressing (stating price) as above.—Charles Butterworth, 88 Sandy Lane, Shaw.

WANTED, named teeth of fish from Old Red Sandstone of Scotland; interesting objects given in exchange.—W. H. Harris, 44 Partridge Road, Cardiff.

DREDGING. A gentleman who is going on a dredging cruise round the British Isles during the ensuing summer will be glad to hear from any one willing to accompany him.—C. P. Ogilvie, Sizewell House, Leiston.

CORRESPONDENCE and exchange invited during season with collectors having duplicate eggs of nightjar, less-spotted woodpecker, dotterel, hawfinch, twite, &c., by R. Standen, Goosnargh, Preston, Lancashire.

WANTED, a good clean copy of the "Student's Manual of Geology," by J. B. Jukes, 3rd ed., edited by A. Geikie, Edinburgh, 1872; also Nos. 15 and 17 for October and December, 1876, of the "Naturalists' Tour of the West Riding, Consolidated Naturalists' Society," full price will be given in each case.—H. Crowther, the Museum, Leeds.

A GENTLEMAN slightly acquainted with geology, would be glad to correspond with another for their mutual benefit.—Address "J." care of Mr. Powell, stationer, Corporation Street, Manchester.

WANTED, Phillips' "Geology of Yorkshire." Send particulars of price to Harry Muller, Rawdon, near Leeds.

GOOD slides of diatom and globigerine ooze ("Challenger" dredging); also parasite from the gill of salmon, in exchange for other good slides.—Nicholas Wright, 8 Duke Street, Lower Broughton, Manchester.

SHELLS of *Haliotis tuberculata* for reptiles or aquarium objects.—Charles Foran, Marshfield House, Eastbourne.

FOR sections of tamus root, showing starch granules and raphides *in situ*, send really well-mounted slides to Thomas Shipton, Chesterfield. Lists exchanged.

FURZE mite (*Tetranychus ulicis*) a good supply of living specimens in exchange for one or two well-mounted slides of the same.—E. D. Marquand, Brockenhurst, Hants.

WANTED to exchange Roscoe and Schorlemmer's "Chemistry," for either of the following; Fownes' "Manual," or Gregory's "Handbook of Chemistry," Hooker's "Student's Flora," or a powerful pocket lens, lens not to be worth less than 15*s*.—J. Pywell, 50 Wellington Street, Leicester.

A VALUABLE collection of British mosses (120 specimens) with notes, from herbarium of late W. Valentine, (offered for Cooke's "Handbook of Fungi."—G. E. Massee, 8 West Grove Terrace, Scarborough.

ASARUM EUROPÆUM, or *Asarabaca* (1129). Living specimens of this rare old British plant in exchange for native living plants of any of the following: 1610, 1611, 1613, 1615, 1621, 1622, 1624, 1625, 1626, 1630, 1631, 1636, 1641, 1642, 1643.—James W. Lloyd, Kington, Herefordshire.

WANTED, 52a, 78 var, 129, 175, 250b, 251, 251b, 418a and b, 492, 501b, 503b, 630b, 651b, 675, 747b, 839, 486b, 853b, 861b, 927b, 966, 992b, 1020, 1026, 1046, 1139, 1139b, 1147b, 1237, 1312, 1484, 1520b, 1530b, 1535b and c, 1555, 1569a, 1582b, 1631, 1632, for other rare plants, or exchange lists.—G. C. Druce, Northampton.

DUPLICATES of fossils from Oolite and others for other fossils.—J. Purdue, Ridgeway, Plympton, Devon.

DRIED fronds of *C. fragilis, C. officinarum, P. vulgare, P. Dryopteris, P. calcareum*, in exchange for *P. alpestre, P. Lonchitis, L. cristata, L. æmula, A. septentrionale, A. germanicum, A. marinum, A. fontanum, A. lanceolatum*, varieties or exotic.—John J. Morgan, Tredegar.

WANTED, Smith and Beck's "Popular Microscope," in exchange for first-class transparent sections of coal, plant or cash.—James Spencer, Salisbury Place, Halifax.

WANTED, a low microscope stand, with or without objectives, Continental model, Smith & Beck's "Economic," or Universal, or similar form; will give in exchange a triple-nose piece, slides, slide cabinets, dissecting instruments, an air pump and other microscopic requirements, and a little cash. Must be sent on approval, to J. A. Harrison, F.R.M.S., The Laboratory, 31 Scale Lane, Hull.

SPINES of ophiocoma, and plates of holothuria: two balsam-mounted slides for exchange. Send lists to J. B., 36 Windsor Terrace, Glasgow.

BOTANICAL specimens and aid offered in exchange for entomological.—3 Belmont Villas, New Brompton, Kent.

THE following unmounted objects for exchange: British and foreign zoophytes, flowers of *Sparmannia Africana*, seeds of *Libertia ixioides* (a beautiful object), &c. Wanted, well-mounted micro slides, also British and foreign zoophytes, and alga for herbarium. Foreign correspondence wanted.—B. B. Scott, 24 Seldon Street, Kensington, Liverpool.

DRABA AIZOIDES from Pennard Castle; fossil ferns from Dean Forest coalfields, in exchange for zoophytes and Chalk fossils. Wanted, book on British zoophytes.—A. Thomson, 17 Wynne Street, Liverpool.

WANTED, fossil clausiliæ and pupæ from Isle of Wight and Essex; also small ammonites and fossil shells from different localities. Recent shells given in exchange.—F. M. Hele, Fairlight, Elmgrove Road, Cotham, Bristol.

OFFERS in exchange (either in foreign land, or foreign marine shells, the former most acceptable) for any of the following British land and fresh-water shells, which I have duplicate specimens of at present—namely, *S. oblonga, Lim. involuta, L. Burnetti, P. ringens, V. pusilla, V. substriata, V. alpestris, V. minutissima, V. angustior, V. Moulinsiana*.—W. Sutton, High Claremont, Newcastle-on-Tyne.

AUTHENTICATED side-blown eggs, swallow-tailed kite, lämmergeier, African buzzard, Waseen chatterer, and several hundred Indian species. Wanted, birds of Europe (Bree), or eggs in exchange.—Sissons, Sharrow, Sheffield.

VOLS. 3, 4, 5, 6, 7, 8, unbound (clean) of the "Entomologists' Monthly Magazine" (Van Voorst) for Newman's "British Moths," microscope, or offers.—R. Colbridge, 57 New Brook Street, Hull.

INTERESTING unmounted material, mostly marine, such as zoophytes, foraminifera, diatoms *in situ*, and otherwise, algæ, entomostraca, tadpoles of crustaceans, holothurian plates, sponge spicula, molluscan palates, &c. Wanted, class slides, photo lens, books on mollusca and fishes or cash if preferable.—T. McGann, Burrin, Ireland.

WANTED, standard works on natural history, in exchange for fossils and algæ. A good copy of Goldsmith's "Animated Nature," coloured plates, 2 vols., well-bound for four dozen good micro slides.—165 Well Street, Birmingham.

AUCHOMENUS PUELLUS, in exchange for other good local coleoptera. Address, J. W. Pickering, 161 Belgrave Street, Birmingham.

FOR piece of Chinese rice paper (pith of tree), send object of interest, to Mrs. Skilton, London Road, Brentford, Middlesex.

FOREIGN land and fresh-water shells wanted, in exchange for American or the rarer British species and varieties. Continental exchanges desired.—Edward Collier, 7 Dale Street, Manchester.

BOOKS, ETC. RECEIVED.

"The Chemistry of Common Life." By Professor Johnston. New edition by Professor Church. London: W. Blackwood & Sons.

"The Flowers of the Sky." By R. A. Proctor. London: Strahan & Co.

"Life and Habit." By Samuel Butler. London: Hardwick & Bogue.

"Microscopic Organisms found in the Blood of Man and Animals, &c." By T. R. Lewis, M.B. Calcutta.

"Certain Effects of Starvation on Vegetable and Animal Tissues." By D. D. Cunningham, M.B. Calcutta.

"The Science Index." January.

"Proceedings of the Chester Society of Natural Science." No. 2.

"Report of the North Staffordshire Naturalists' Field Club, 1878."

"The Forester. Nottingham High School Magazine." Easter, 1879.

"Entomological Papers." By C. V. Riley, M.A.

"Journal of Proceedings of the Winchester and Hampshire Scientific and Literary Society." Vol. iii. part i. 1878.

"Midland Naturalist." April.

"American Naturalist." March.

"Revue Mycologique." January.

"Feuille des Jeunes Naturalistes." April.

"Guide du Naturaliste." January.

"Le Monde de la Science et de l'Industrie." February.

"Canadian Entomologist." February.

"Boston Journal of Chemistry." April.

"Land and Water." April.

"Journal of Quekett Microscopical Club." No. 39.

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 12TH ULT. FROM:—E. J. B. W.—W. W. H.—H. R.—D. B.—L. H.—E. D.—J. F. R.—T. B. W.—T. W. H.—W. B.—H. M. J. U.—J. C.—E. J. B. W.—E. L.—W. H. H.—C. P. O.—W. H. J.—C. B.—J. R. S. C.—J. J.—Dr. P. Q. K.—J. F. M.—J. H. W.—H. W. R.—A. G. W.—M. H. R.—B. R. P.—A. W.—T. G. H.—F. L. St. A.—J. M. C.—W. G. T.—G. H.—J. C.—H. C.—J. F. U.—J. P. G.—M. M.—T. B. L.—J. O. B.—W. A. D.—W. E. M.—S. T.—C. F.—E. B. de M.—C. B.—T. S.—W. K.—R. S. G.—J. S.—H. M.—J. P.—E. D. M.—R. S.—W. H. H.—G. E. M.—J. W. L.—G. C. D.—J. J. M.—J. C.—F. K.—Sir J. H.—W. S. J.—J. B.—F. W. M.—Dr. M.—G. H.—T. W. D.—M. L. T. W.—J. W. P.—B. M. W.—Dr. D. S.—G. M.—T. B. L.—T. McG.—R. C.—J. W. S.—W. S.—F. M. H.—A. T.—B. B. S.—H. P. M.—J. S. H.—&c.

THE PREPARATION OF INSECTS FOR MICROSCOPICAL EXAMINATION.

[*Continued from p.* 103.]

AND now as to the question of staining. Some have strong objections to staining specimens, for they say that it merely makes the object prettier, and that the natural colour is destroyed. These objections are quite sufficiently answered by the consideration that staining does more than beautify an object,—details visible with difficulty or not at all in an unstained specimen, are easily seen in one that is properly stained; and why, after all, should a slide not be made as beautiful as possible? As for destroying the natural colour, that is generally done in the ordinary process of mounting. I am therefore in favour of staining, if it be properly done.

The following are the stains which I use:—Dr. Beale's carmine fluid. The recipe for this may be found in so many books, that it is unnecessary to give it again. Aquæous anilin blue.—Dissolve ten grains of anilin blue in one drachm of spirits; add half an ounce of distilled water, and half an ounce of glycerine, and filter: let the mixture stand for a week or a fortnight, and then pour off the clear fluid for use. Anilin blue in oil of cloves.—Dissolve five grains of anilin blue in half a drachm of absolute alcohol. Mix the solution with an ounce of oil of cloves, and filter it through blotting paper. Magenta fluid.—1. A few drops of Judson's magenta dye in water, to which a little glycerine has been added. This is chiefly for staining chitine. 2. A very weak solution of the dye in methylated spirit. This is for staining muscles. Hæmatoxyline.—Boil some logwood in water until a strong infusion is made; filter; dissolve a quarter of an ounce of alum in an ounce of water; mix, say twenty drops of the logwood infusion with about an ounce and a half of distilled water, and add enough of the alum solution to make the fluid a bright purple; filter, and the stain is ready for use. With the exception of anilin blue in oil of cloves, which is rather expensive, all these fluids cost next to nothing.

No precise directions can be given for staining, because the process requires to be varied a little for almost every object, but a little information as to the various properties of the different fluids will be useful. Carmine fluid does not stain chitine in the least, but it is excellent for internal organs and muscular tissue. The only objection to it is that it will not keep more than a month. A solution of hæmatoxyline, of about one-fourth of the strength of the recipe given above, answers every purpose of carmine fluid. It is not such a pretty colour, but it will keep very much longer. Muscular tissue needs about half an hour's immersion in this fluid to stain it a nice colour. Hæmatoxyline, according to the recipe, stains chitine very nicely. The time required to colour the object properly varies from half a day to forty-eight hours.

Specimens stained with carmine or hæmatoxyline may be mounted in either glycerine or balsam, but those stained by any of the other fluids can be mounted in balsam only. Aqueous anilin blue is a very useful stain. It will stain chitine fairly well, but not when it is very hard, as in the barbs of a wasp's sting. It is good for such things as mites, flies' mouths, and especially for crustacea, such as entomostraca, wood-lice, &c. Magenta will stain anything, but it has a special affinity for chitine. It is very soluble in alcohol, and specimens stained with it must be hurried through the alcohol into oil of cloves in a few minutes, or all the colour will be washed out. By taking advantage of its special affinity for hard chitine, a very beautiful and instructive double staining may be effected in this way. Use a watch glass for soaking the specimens in absolute alcohol: pour

the alcohol away and drop on a little of the oil of cloves anilin blue stain, and leave it not more than five minutes. The specimens must then be washed two or three times in benzine. The blue drives out the magenta from the membranous parts of the insect, leaving it in the chitinous portion: a red and blue specimen is the result. If the specimen be left in the fluid too long, the blue will be precipitated on its hairs. The specimen is not spoilt, for the precipitate may be immediately dissolved, by dipping the object into absolute alcohol. After this it can be replaced in benzine directly. It is magenta, and especially the oil of cloves anilin blue stain, that the natural oil of Canada balsam causes to fade; but, as far as I can see, after about fifteen months' trial, dammar has no effect on them, the benzine fixing them permanently. It is therefore better, as precautionary measures, not to use balsam for any stained specimens whatever, and to thoroughly wash them all in benzine before mounting them in dammar.

When it is desirable that any insect should be stained, in almost every case, the proper time or part of the mounting process at which to stain it is after the soaking in acetic acid.

None of the numerous soakings and washings in the processes described above is without its reason. To give the why and the wherefore of everything would take too much space, but, if any important washing be omitted, the slide will not turn out so well as it ought to do. It is a much less complicated matter to mount a specimen in reality than to read about it; but, to make the description as clear as possible, I give an abstract of the way in which three-fourths of insects may be mounted. The time needed for each stage of the process is noted.

No. 1. Soak the insect, or part of it, in liquor potassæ until transparent enough. Boil in clean liquor potassæ, ten seconds. Wash in distilled water.

No. 2. Soak in acetic acid, half an hour. Wash in distilled water.

No. 3. Stain, when necessary.

No. 4. Wash in spirits. Soak in absolute alcohol, three to ten minutes.

No. 5. Soak in pure oil of cloves, five minutes, or in anilin blue oil of cloves three to five minutes.

No. 6. Wash in benzine. Wash in perfectly clean benzine [if stained].

[Specimens may be kept in benzine for a long time without injury.]

No. 7. Mount in dammar or balsam.

None of the other processes have so many stages as this.

I will now briefly detail for what kinds of insects the various processes are suited, but it is obvious that under this head only the most general directions can be given.

Whole insects look best in cells in glycerine, or, if opaque, in water, and some may be mounted dry; these media, as I have said above, are not intended to display every detail, but only to give a general idea of the object. If the insect be rare, so that the mounter has no specimens for dissection, some of its beauty must needs be sacrificed by the potash and balsam process, supposing that it is particularly desired to make out some detail, and at the same time, to mount the specimen whole. I venture to think that no insect larger than a house fly should be mounted whole. Those wretchedly flat things, which are only fit for magic-lantern slides, such as whole garden spiders, butterflies, or even humble-bees, are my peculiar abomination. I have seen a great many of these "whole insect slides," some by [so-called] "first-rate mounters," but in none of them yet have I seen the features which make an insect beautiful on the one hand and interesting on the other, at all nicely shown. In attempting too much everything is lost.

Almost all dissected parts of insects may be mounted in balsam by process 1. Only transparent specimens should be stained. Double staining is especially suited for the following sorts of objects. Bees' and wasps' mouths and stings; gizzards (these doubly stained are extremely beautiful); spiders' feet; the mouths of most insects; mites of the family Trombidium; in fact, all parts of insects in which there is much soft membrane and a little hard chitine. For transparent ants and flies, and for such mites as cheese mites, soaking in ether (process 2) is suitable. When small crustacea are prepared for mounting [if it is wished that the shells be softened], they must be soaked for a longer time in acetic acid than is necessary for insects. I find anilin blue the best stain for some, and hæmatoxyline for others.

I have endeavoured to describe as clearly as I know how my methods of preparing insects, and I am told that some of my slides are rather successful. I do not in the least pretend to entire originality. Some of the "dodges," to use a current phrase, "are my own invention," but very many of them are the ideas of others (as I consider) improved on. Those who wish to make good slides should aim to improve on the methods here given, and it is only by trying different processes and varying them on the same object that success is likely to be achieved.

Oxford. H. M. J. UNDERHILL.

MY HEDGEHOGS.

IN May of last year, having become possessed of two hedgehogs, and as the hedgehog is an animal that I had heard so many idle stories about, and wishing to learn something about their history and habits, &c., I determined to keep them.

The first experiment that I made, was to duck them in a pail of water, in order that self-preservation might compel them to unravel themselves, so that I could inspect them properly.

My next move was to provide a suitable residence for them; this was done in the shape of an old box,

some wire being put in the front, and some hay placed in the bottom, which answered, although a little cramped for room, admirably.

About their food I was in great doubt. It would be impossible for me to provide a regular supply of frogs, snails, &c. However, as a substitute, I tried bread and milk, and as they did not eat during the day, I was in great fears lest they had died, or would not eat at all, and it was with a troubled mind that I took my departure from them that night. The next morning my fears and doubts were agreeably dissipated, by finding the tin empty. I then found that my charges were nocturnal in their habits.

Their staple food was a tin of bread and sweet milk, supplied every evening.

After a short time they left off their shyness, and I could handle them comfortably. One morning I brought home a handful of snails, which I had met with in my rambles and supplied these to them, when immediately they commenced to eat them, shells and all, from which I augured that they had excellent teeth. I next managed to supply them with a few frogs, which they relished exceedingly. I noticed that whenever the frog was put into their cage, the hedgehogs remained perfectly motionless until they got a favourable chance, when they made for one of the frog's hind legs.

One morning they were near killing a tame blackbird which had inadvertently hopped into their cage, but which was rescued in the very nick of time.

The place where I kept them was a small loft used by tinsmiths, and I was wont in the summer nights to allow them to ramble about, and the noise that they made scrambling over the cans, &c., after the mice was astonishing.

Some people suppose that their pace is slow; the pace of mine was quite the reverse, and they could run along pretty quickly.

They never hesitated about jumping from a height, in fact one of them deliberately and coolly threw itself down a twelve-foot ladder, bouncing off the steps like an india-rubber ball, and when it reached the bottom was making off, a proceeding which was promptly stopped on my part.

They were thirsty animals, always drinking whenever they could, so that I placed water in their cage every morning for their benefit.

As regards those old-woman stories circulated about the animal, it is needless for me to state that they are all fabrications. One night I gave them apple slices for the express purpose of trying them, and in the morning there was not a tooth print on them, in fact the only fruit mine ate were cherries.

Another calumny is their eating game birds' eggs. Now, one night I starved mine, giving them only a whole hen egg, and in the morning the egg was perfectly whole, not a bruise or crack on it.

Mine continued thus in the "even tenor of their way" till the latter end of October, when a change was apparent. They got very fat and ate less, and finally went to sleep about November 1. I packed them in a box with hay. However one of them escaped and was not found till February 27. They both awoke on March 1, and I may safely say, that the one in the box did not receive a pick of food during the whole four months of hybernation. When they awoke they were very emaciated.

Their weights before the hybernation were respectively, 2lbs. 6oz. and 2lbs.; after, 1lb. 9oz. and 1lb. 8oz.; having lost 13oz. and 8oz. respectively. During the hybernation they remained rolled up in a ball, and their breathing was very loud and distinct.

But in a short time they regained their original plumpness, and are now fatter than ever. I am in hopes they will breed this year.

THE NEW FOREST.

By E. D. Marquand.

[*Continued from p.* 99.]

It is not necessary to speak of the productiveness of the New Forest as an insect-collector's hunting-ground, since it is probably better known to entomologists than to any other class of naturalists. In a given area of country—say twenty miles square—the entomologist has decidedly an advantage over the botanist: the former may work the same district for a lifetime and every year find something new—while the latter has a *definite*, however *extensive*, number of plants to discover. Insects move; plants do not. A dozen close observers possessing the requisite knowledge might catalogue the entire flora of a district—phanerogamic and cryptogamic—in a few years, while the insect fauna would continually be receiving fresh additions from the neighbouring country, and so be practically inexhaustible. Of course, on an island—Guernsey or Jersey, for instance—both classes of naturalists would be on a par.

About fifty species of butterflies, out of a total of sixty-four for Great Britain, have been taken here, and I am happy to be able to record the occurrence of a very rare species which, as far as my knowledge goes, has not hitherto been taken in the Forest, or included among its indigenous species. This is the Bath White (*Pieris daplidice*), a fine specimen of which I captured on June 12, 1876, in an open wood not far from Lyndhurst; it is now in my cabinet. Singularly enough, four days afterwards I saw another specimen in my garden flying to heliotrope; it alighted two or three times, but as I had no net it escaped. *C. edusa* was out in great force here in 1877; they first appeared on June 4, the date on which they seem to have occurred nearly all over the country. In July they disappeared, and the second brood came out on August 10, continuing till after the middle of October. *C. hyale* is rare, and so is

A. cratægi. *L. sinapis* may always be had by those who know where to go for them, for they do not wander far from their haunts, though less strictly local than *A. Galathea*, for which I know two stations, widely apart. The little Duke of Burgundy Fritillary (*N. lucina*) I have seen and taken, but not in such numbers as I did some years ago at Selborne. *G. c-album* occasionally appears, but I never saw it. The large Fritillaries and *L. Sybilla* are very abundant in all the large woods.

As every one knows, these are the headquarters of the two splendid Red Underwings *C. nupta* and *C. promissa*, perhaps the most beautiful moths which

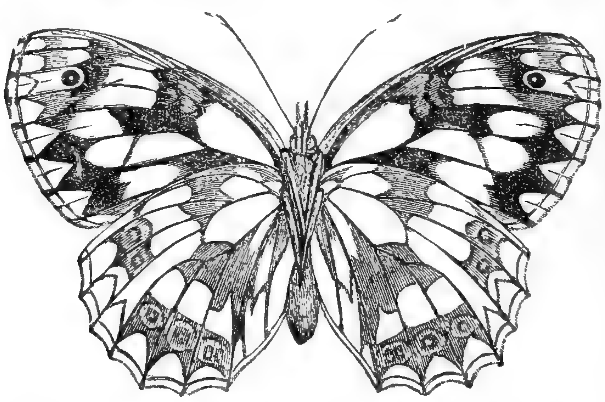

Fig. 102.—Marbled white (*Melanagria Galathea*).

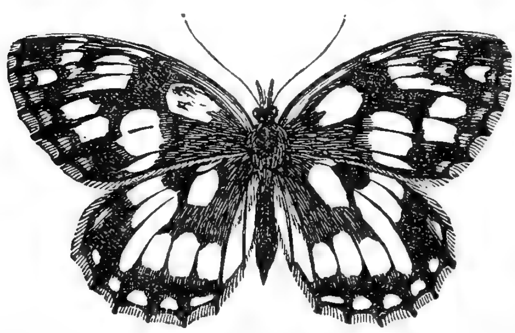

Fig. 103.—Marbled white (*Melanagria Galathea*). Upper side.

the collector can hope to take away, unless they yield the palm of beauty to the lovely green *D. Orion* or the fine black and yellow *A. villica*, of which I once netted a variety with almost spotless hind-wings. Two years ago I captured a *female E. russula*: the males are tolerably common, but the other sex is, I believe, usually considered a great rarity. *S. fuciformis* is usually abundant just for a short season, frequenting rhododendrons. The splendid Emperor Moth (*S. pavonia*) occurs in plenty, but is easier to rear from the larva than to catch on the wing. I have seen the perfect insect as early as April 18; and I once collected in a thorn hedge, and subsequently reared the large smoke-coloured caterpillars of the odd-looking Lappet (*G. quercifolia*). *E. Jacobææ* is a perfect pest, especially in the larva state, swarming in masses on Ragwort. *F. piniaria* abounds in the fir plantations, together with the speckled *V. maculata*. It would be a needless occupation of space to enumerate even a tithe of the good moths that occur. Suffice it to say that at least three-fourths of the British macro-lepidoptera have been taken here.

If the New Forest is a favourite hunting-ground with lepidopterists, it is scarcely less known to beetle collectors, and the coleopterist must possess a very fair collection indeed who can spend a week here without adding something to it. *Carabus nitens* is occasionally found on moist heaths, but by no means so plentifully as one would be led to suppose from books; much more common is the brilliant *Pœcilus cupreus*, which it somewhat resembles. The great stagbeetle abounds, and now and again one comes across its smaller relative, *Dorcus parallelopipedus*. Once it was my good fortune to come upon a dead specimen of the giant longicorn (*Prionus coriarius*), a most noble fellow, formidable even in death. The Rhynchophora are probably very numerous here; *Hylobius abietis* was extremely abundant two years ago. I used to find them in all sorts of odd corners in and out of the house; since then I have not seen more than a couple. The large and handsome *Cleonus nebulosus* has come under my notice once or twice, together with the little grey *Gronops lunatus*. *Cryptocephalus sericeus*—brilliant silky green—occurs in the flowers of *Hieracium*

Fig. 104.—Duke of Burgundy Fritillary (*Nemeobius lucina*). Under side.

Fig. 105.—Duke of Burgundy Fritillary (*Nemeobius lucina*). Upper side.

pilosella; *Coccinella* 12-*punctata*, abounds on the coast, and so does *Opatrum sabulosum*; and among young oaks in the forest I have occasionally seen the handsome scarlet Skipjack, *Elater sanguineus*, flying in the hot sunshine.

We have two very elegant members of the cercopidæ: *Cercopis sanguinolenta*, with black and crimson elytra, and a smaller bright green, and I fancy local, species—a *Jassus*, perhaps—which I found in abundance in sweeping the marshy border of a wood. Dragon-flies are numerous, both in species and individuals. By-the-by, if some one acquainted with our British neuroptera—the *Libellula* section—would send to SCIENCE-GOSSIP a synopsis of genera and species, I am sure it would be regarded as an act of kindness.

The Forest-fly (*Hippobosca equina*) is one of the features of the district. Thick, black masses of these repulsive insects may be seen on every horse and cow; and while the native cattle, "to the manner born," treat them with supreme indifference, a strange animal is driven frantic at the approach of one. Can any one tell me why? It is generally supposed that their food is the blood of the cattle they infest, but the organs of the mouth, which are of extreme simplicity, seem singularly incompetent to pierce the hide of a horse or cow. The impression among some of the people here is that they pull out the hairs and

suck the root bulbs. In favour of this view it may be noted that no wound or blood is ever observed where these flies have congregated. Perhaps some of the readers of this may be able to throw light on the subject. By the way, these flies are exceedingly difficult to catch, and cannot be killed by a blow. I have seen a man's fist brought down on one with a force almost sufficient to crush a stagbeetle; the fly gave a little buzz of contempt, and flew to the window. In flying their hum is scarcely audible, and they alight on the face or hands without being felt. They walk sideways, like crabs. Much hand-

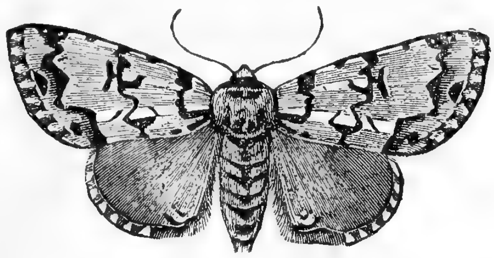

Fig. 106.—Scarce Merveil-du-Jour *(Diphthera orion)*.

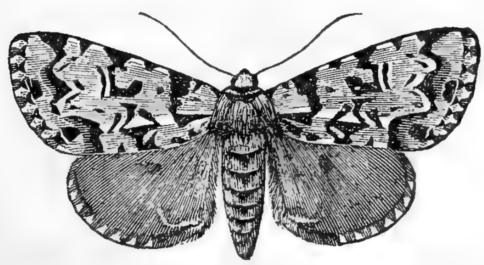

Fig. 107.—Variety of Merveil-du-Jour *(Diphthera orion)*. See Newman's "British Moths," page 248.

Fig. 108.—The Cream-spot Tiger-moth *(Chelonia villica)*.

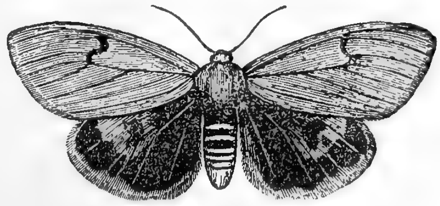

Fig. 109.—The Clouded Buff-moth *(Euthemonia russula)*. Female.

somer insects, though certainly more ferocious and formidable, are the *Tabani*, of which we have several species. Collectors are well aware of their blood-thirsty propensities; the bite of the little grey *Hæmatopota pluvialis* is sharp enough, but woe betide any one who gets a nip from that sanguinary monster, *Tabanus bovinus*. His loud, booming hum is not to be mistaken, but his bite is something to be remembered. I captured a couple while they were busy driving their lancets into the nether garments (fortunately thick ones) of a companion.

During last summer I took on the flowers of a water-mint a very curious insect—apparently a bee or ichneumon-fly—but it was remarkable by the entire absence of even the rudiments of wings. A brief description, abridged from my journal, may enable some one to identify it, in which case I shall be thankful for the name and any information about it, as I have never heard of apterous bees. Length, half an inch; head, antennæ, and legs, black; eyes, small; ocelli, none; thorax, bright chestnut-brown, with parallel sides, sloping beneath, *without traces of wings;* abdomen wasp-like, black, with three narrow bands of pale golden silky hairs: apex of abdomen acute and incurved.

Before passing on to the botany of this district I wish to say just a few words on two sections to which I have not been able to give much attention, though I have collected and noted a good number of species. First, the arachnida—or rather, I should say, the araneidæ. *Atypus Sulzeri*, our British *Mygale*, is probably a rare spider in the Forest, at least in those parts with which I am familiar, for only one specimen, a male, has come under my notice. *Lycosa andrenivora* is very common on our heaths, and so is *Tetragnatha extensa*, with its long legs stretched out in a straight line in the centre of its web above a little stream or pool. *Epeira umbratica*, "a spider of most villanous aspect," I have found in old posts, and a pretty variety of *Thomisus abbreviatus*, of a pale rose-pink colour, without a shade of yellow; this took on heath blossom, the hue of which it closely approached—another instance of insect mimicry.

Among the mollusca I have to record *Clausilia dubia*—at least, such I take it to be. It measures eight lines, while our *C. rugosa* only averages five; besides which, it is very much larger in every respect. *Helicella excavata* is generally distributed, and, in some woods, as Wilverley, very common. *H. fulva*, also, I have found, and *Planorbis contortus* in some places abundantly. The minute bivalve (*Pisidium pusillum*) is very numerous, often in company with the delicate little *Carychium minimum*—a shell so tiny that one almost requires a lens to see it at all.

(*To be continued.*)

THE LOVES OF THE FISHES.

COLD-BLOODED creatures are commonly not credited with any great degree of moral excellence. The affections of parent and lover are usually supposed to be wanting, and the emotion of gratitude is probably never dreamed of in connection with creatures so low in the scale of creation. Nor probably is it right to invest them with any great degree of eminence in this particular. Nevertheless, however, it is a real fact that some fishes not only exhibit

unmistakable signs of the affections alluded to, but in one case—the pike—even gratitude seems to be manifested. My readers may possible smile incredulously at the suggestion that any excellence of feeling can be associated with the "fresh-water wolf," over whose cruel and remorseless jaws the Dantean epigraph, "All hope abandon, ye who enter here," might fitly be written. Such, however, is the case.

As the warm spring weather approaches, and summer hastens to ensue, the pike seeks the convenient tributaries of the river, or the shallow and weeded parts of the lake wherein to spawn. At this time the males and females may be presumed to be separate and unmated. Guided by the reproductive instinct, however, they more or less quickly pair; and it is just prior to spawning that the delight which they experience with each other's society is most apparent. The female is generally larger than the male, and piscine caresses are mutually indulged in. I have frequently seen the male rub his mottled sides against his partner, and gambol and dash about as if to show off his glee and his prowess as a water athlete; and on one occasion I remember the caresses of a two-pound fish were so energetic as to completely force the female up on the sloping bank. I captured the fish and replaced her in the water at considerable distance, but the remorseful widower was in the neighbourhood where I had first seen them on my return, evidently waiting the return of his mate. Whether his patience was ultimately rewarded deponent saith not.

The pike is for the most part monogamous. An example of this is interestingly given by Mr. Manley in his "Fish and Fishing." He says, "I was jack-fishing in the lake in Earl Fitzhardinge's park, and had left a paternoster for perch baited with gudgeon in the sluggish stream above the small bridge. On my return from a walk round trolling, I found I had to encounter a fine jack which had attached herself to the paternoster, and after no little trouble I landed my fish, which scaled over 14 lbs. In the same manner, and exactly at the same spot, just a week afterwards I took another—the gentleman fish this time weighing 13 lbs. I have no doubt that these were an engaged or rather married pair just at the commencement of their honeymoon, and that after the cruel (I have often thought since that it was very cruel) capture of his bride, the bridegroom, disconsolate, hung about the spot, and so came also to a miserable end within a few days of the decease of his wife." That it is a very customary occurrence to secure a pair of fish from one spot no angler will deny. In fact, on taking a good fish from any particular spot it is a recognised plan amongst the brothers of the craft to try for the other fish. In lakes the pairing is certainly more noticeable than in rivers. Whether the fishes hunt their food in pairs as a rule I cannot say, but that they reside in contiguity is an indisputable fact. The ruff also will not live singly in aquaria, but die off—at least this is my experience. Unhappily the jack does not exhibit much parental affection, for it is an indiscriminate cannibal, and perhaps the best bait for a large pike is a small jack.

Having thus shown that the character of this voracious fish of prey is of a somewhat lighter hue than generally supposed, perhaps the reader will be prepared to hear a further good trait, the existence of which is however indubitably more questionable than the former. I refer to the exhibition of that rarest of virtues in the genus *homo*, namely, gratitude. In order to justify the idea that *Esox Lucius* exhibits this noble quality, I must refer at some little length to another fish of widely different family—the tench. Now this fish is covered with a thick glutinous slime, which is supposed to be of such medicinal worth to the piscine tribes that at the "touch of tenches" wounds and other disorders that fish is heir to are instantly bettered, and if the contiguity of the fishes be preserved, are ultimately healed. It is a certain fact that trout are rendered healthier by the introduction of a tench or two amongst them, and I have known several instances of the growth of byssus being arrested on the advent of this "physician of fishes." Camden asserts that this is the case with pike, and his language is pronounced with no air of hesitation, though he was probably not a naturalist. Speaking of Southwark he says, "Here have I seen the bellies of pikes which have been rent open have their gaping wounds presently closed by the touch of tenches, and by their glutinous slime perfectly healed up." Of course this assertion may be taken with caution, but the concurrent testimony of many observers as to the healing power manifested by this fish must be in some sort accepted.

Now here comes in the gratitude of the pike, if the idea is not too pretty to be true. Be he ever so hungry he never takes a tench. Carp and all other fish he will eat incontinently, in fact nothing else from a red cork float to a baby, or from a Polish damsel's foot to a mule's nose, comes amiss to him, but a tench he will not touch. The following admirable verses state the matter better than I can:

> "The pike, fell tyrant of the liquid plain,
> With ravenous haste devours his fellow train,
> Yet howsoe'er by raging famine pined,
> The tench he spares—a medicinal kind;
> For when by wounds distrest or sore diseased,
> He courts the salutary fish for ease,
> Close to his scales the kind physician glides,
> And sweats a healing balsam from his sides."

Who will now deny his pikeship the virtues I claim for him—conjugal constancy and affection and gratitude? By-the-by, speaking of tench reminds me that this fish is especially tumultuous in its affection and movements during the spawning season, and frolics and jostles right lovingly. So much is this the case, that I have repeatedly taken them by hand when they have been too absorbed in their pursuit of each other to be aware of danger.

The chivalrous courage of the salmonidæ in this particular is well known. Especially is it so with the "lordly" salmon. A Guinevere awaiting her victorious Lancelot might emblem a sheeny female salmon awaiting her lord as he wages fierce war against perhaps four or five other fish all equal to himself in size. But shame on female fickleness; if her champion succumbs in the conquest, she is quite prepared, like another Queen of Denmark, to receive a new lord from amongst the victors. A battle of peculiar fierceness of this kind is ably detailed by Mr. Newman in the "Zoologist" for 1847, page 1650: "While several gentlemen," he says, "of the Preventive service were on their rounds the other day and patrolling along the Findhorn between Glenferness and Dalcie Bridge, they observed an unusual commotion among the spawning-beds of the ford. On approaching the spot two large male salmon were seen engaged in mortal combat for a female. Never did chivalrous knights do battle for the hand of a lady fair more fiercely than these lords of the flood. The tranquil bosom of the stream was lashed into foam by the struggles of the finny antagonists, the object of the fray meantime beating silently about, 'spectatress of the fight.' From the appearance of the stream dyed with blood, and gradually assuming its former smooth surface, it was evident that the contest was over. One of the salmon at last floundered on the surface dead, and the victor, it may be conjectured, exhaustedly bore off his prize." From this it would certainly appear that this prince of all fishes tastes to some extent the *vinum dæmonum* of love. I cannot say much for his parental affection, seeing that some of the older male-fish are most inveterate devourers of the ova and embryo fish.

Trout are also as fierce and plucky in their love affairs, and I have witnessed some magnificent tussles in which, like bull dogs, they have torn the flesh from each other with unrelenting ferocity.

For domestic attachments however the stickleback stands far above all other freshwater fishes. Towards early summer time the male increases in beauty, putting on the most gorgeous dress of green and silver, whilst his movements become inconceivably elegant and swift and full of vivacity. Presently he casts his eyes about him for a suitable locality for his nest, and having selected a site, perhaps in some tiny eddy, he commences to build. The operation of building is a work of time, but it is done in a very workmanlike manner and carefully. First a foundation is laid and cemented with a sort of gluten secreted by the fish himself. Against this currents of water are projected by the fins of the builder, and sometimes, to render certainty doubly certain, he hurls himself repeatedly against the structure. His materials are pieces of stick and other suitable *débris* collected in the neighbourhood. Having securely built the foundation he commences to erect the walls. This is effected in the same style, and finally a nest is completed, with holes for ingress and egress opposite each other. The whole fabric is repeatedly tested as above described, and when everything seems firm and stable the building is ready for the ova.

Watching the laborious operations of the industrious little gentleman at a respectful distance, behold four or five females of decidedly less brilliant appearance. When he is ready he with sidelong glances and coquettish movements approaches them, and communicates in some inaudible language his wishes and desires. Presently a female, responsive to his invitation, leaves her sisters and follows Sir Stickleback to the nest he has prepared. After entering himself and passing through he indicates that all is in readiness. Lady Stickleback accordingly enters without compunction, and remains hidden for some time. After depositing the ova she passes out the other side, and he enters to complete the process of impregnation. When this is done her ladyship is dismissed, and a layer of sand is strewn over the eggs. This accomplished, another female is invited, and the same operation ensues, again and again, till four or five layers of ova are deposited. Now comes the anxious time for Papa Stickleback. The females are very inquisitive, and have to be kept back most unceremoniously from poking their noses into the nest. They are of a decidedly cannibalistic turn of mind also, and would devour the objects of their lord's solicitude if allowed. So they are sometimes hurled right and left by this piscine Paladin in his twinkling armour of many colours.

After an interval of lesser or greater duration, according to the temperature, the tiny sticklebacks make their appearance. The trouble they are now to their faithful parent transcends all conception. To keep them together and guard them from enemies of all kinds becomes his task, and right valiantly does he perform it. Combat after combat engages him, both females and males are against him, and like a famous historical personage his hand is against every one in the interests of his tiny family. Now and then one little rascal will stray, but only to be brought back in its father's powerful jaws, and to receive an admonitory shake. At last they are disbanded, and "love's labour" for the nonce becomes a thing of the past.

Though not a nest-builder the Miller's Thumb exhibits like characteristics to the Stickleback, and guards its ova and young with a constancy of purpose and ferocity of temper alike amusing and instructive.

I think I have said enough to justify the title of this paper. With salt-water fishes I have not meddled, but doubtless many instances of constancy and affection might be cited in reference to them. The variety of fish-life is marvellous, and in the scale of being one is sometimes disposed to elevate them highly.

JOHN H. KEENE.

BOTANICAL WORK FOR JUNE.

THE lateness of the present botanical season will enable us somewhat to mitigate the confusion which prevails about *Cardamine hirsuta* and *C. sylvatica;* perhaps a few words will make them more easily understood. It is very likely that only one plant (*C. hirsuta*) has been examined by many workers, hence the confusion.

1. *C. sylvatica* (Link). Biennial, radical. Leaves very few. Leaflets large, light green. Lower leaflets only on short petioles distinctly lobed.

2. *C. hirsuta* (Linn.). Annual, radical. Leaves in a dense rosette. Leaflets all on short petioles, small, dark green.

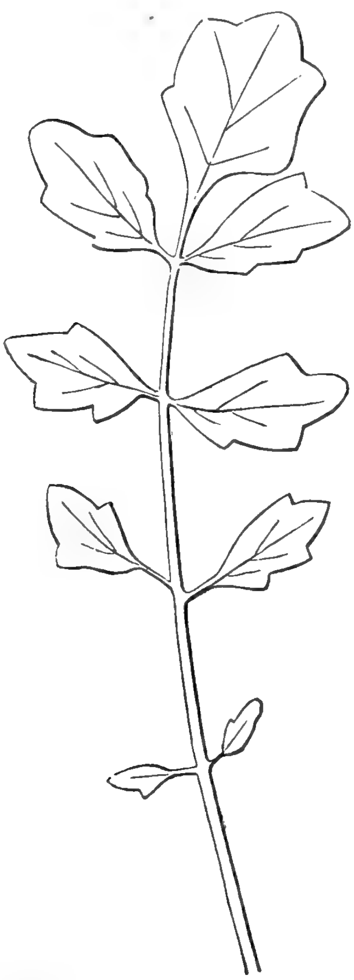

Fig. 110.—Leaflet of *Cardamine sylvatica.*

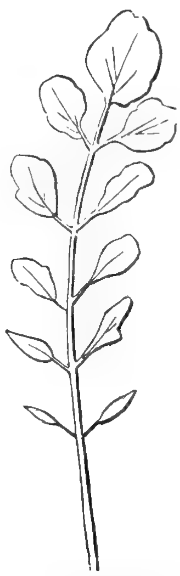

Fig. 111.—Leaflet of *C. hirsuta.*

The illustrations are of the natural size.

Vegetation of every kind is backward; this is the latest spring we have ever known, but we shall find the silver-weed plentiful during the present month. The name *Potentilla anserina* (Linn.) is made to cover two very dissimilar forms in our English Floras; having met with them in many counties, we have the more confidence in bringing them before our readers, and for this purpose have adopted the names in *Fl. des Environs de Paris.*

1. *Potentilla incana* (Cuss. et Germ.). A large plant. Leaves densely covered with silvery down on both sides.

2. *P. pusilla* (Cuss. et Germ.). A smaller species, known by its compact rosette of radical leaves, which lie close to the ground, seldom, or with but few hairs on upper surface.

No. 1 is our common species, No. 2 is frequently seen by waysides.

Herb Robert, or Stinking Crane's Bill, now makes many a shady lane gay with its fern-like leaves and elegant blossoms. Let us spend a few hours during the present season in looking over its many peculiarities: first, we shall find it can adapt itself to all kinds of conceivable situations, then we shall observe it differs widely in appearance and habit: thus, at least, three distinct varieties are met with.

1. *Geranium Robertianum* (Linn.), (proper). A large straggling plant covered with glandular hairs. Claw of pets. equal in length to the blade. Carpels hairy.

2. *G. modestum* (Jord.). A smaller plant, with more tufted habit, nearly or quite glabrous (smooth).

Fig. 112.—Herb-Robert *(Geranium Robertianum).*

Claw of pet. much longer than the blade. Carpels glabrous.

3. *G. purpureum* (Jord.). A beautiful plant, veins of leaves and internodes tinged with pink. Pets. purple. Leaves finely cut and divided.

Nos. 1 and 3 are our lowland species; the smooth plant, No. 2, is found on hills; we generally expect to find it in gravel pits.

The common Stork's-bill is now worthy of notice, although it is an unpleasant plant to handle.

4. *Erodium cicutarium* (Linn.) wherever it occurs, is generally seen in abundance, and probably the varieties named below are not uncommon in most districts.

5. *E. cicutarium* (proper) has flowers whose pets. are not spotted, and carpels furrowed. Leaves small, not much divided.

6. *E. commixtum* (Jord.), a larger and coarser-looking plant. Leaves not unlike *E. moschatum.* Upper pets. distinctly spotted at the base.

7. *E. pilosum* (Bor.). Upper pets. not spotted at the base. Leaves much cut and divided, with long hairs over the whole plant.

During the past few years, our rambles have chiefly been over gravelly and sandy fields; these, although in a great measure barren to the farmer, have yielded

Fig. 113.—*Filago canescens* (Jord.).

Fig. 114.—*Filago spathulata* (Presl).

us a rich harvest; amongst the rest, the cud-weeds have received a thorough investigation, so that now we number probably fifty sheets in our British herbaria, containing specimens of the Gnaphalia and Filago; the latter are not so numerous, and vary but little, but we lay before our readers the British section of this genus, because we do not regard *F. gallica* (L.) as a native species—it is now by all our best botanists looked upon as a colonist only.

Filago.—Section 1. Procumbent; section 2. Erect.

Section 1.—In "Student's Flora," *F. germanica* (L.) covers all the following forms, viz.:

1. *Filago canescens* (Jord.), (species according to continental authorities) leaves linear, tomentose. Heads of flowers leafless, tips of bracts yellow; common in sandy pastures. Fig. 113.

2. *Filago apiculata* (G. E. Sm.), much larger than the last; bracts purple. Keel-shaped, tips deep pink. Rare.

3. *Filago spathulata* (Presl) (species). A short tufted plant. Leaves *spathulate.* Bracts, keel-shaped, tips pale yellow. Frequent on gravelly soils. Fig. 114.

Section 2.—4. *Filago minima* (Fries). Leaves ¼-inch, very small, lanceolate. A small, slender, and erect species, from 6 to 10 inches. Frequent on dry sandy banks.

A Fishing Rat.—While standing by a stream the other day I saw a large grey rat swimming about with unusual activity, and observing its movements for awhile I saw it dive below a bank, reappear and dive again, and so continue for some time; but at last to my surprise it reappeared with a fine trout in its mouth, four or five inches in length, and struggling in vain for its life, while the rat made quickly for its hole apparently elevated with success.—*T. Sim, Fyvie.*

THE BEAR IN SWEDEN AND NORWAY.

By John Wager.

Part I.

The writer, though not a sportsman, has indulged in many wild and solitary wanderings through Swedish forests and over Norwegian fjelds; several times he has been benighted amid such scenes, yet never chanced to make personal acquaintance with Bruin in his native resorts, though he frequently heard of his proximity, and once saw the remains of a bear that had been shot by a peasant on the previous day; he has also collected sundry ursine anecdotes, which naturalists inclined for gossip may be willing to hear. First, however, it will perhaps be well, for the benefit of readers not familiar with the subject, to prefix a brief account, from Scandinavian sources, of the natural history of the northern bear.

The peasants of Norway and Sweden distinguish several kinds of bears, such as the grass-bear, the ant-bear, and the horse-bear; but these are mere varieties, or individuals in different stages of development, of one and the same species. Its colour is dark brown or nearly black; sometimes lighter, and especially valued when the fur is tipped with silver-grey. A full-grown bear will measure six feet, or even more in length, by three feet in height; and weigh from five to six, and occasionally eight, hundred pounds. Bruin has a sweet tooth in his head, and while young at least, usually contents himself with a vegetable diet;—grass, roots, the juicy stem and leaves of angelica, whortleberries, cloud-berries, and other berries which abound in the forests, including those of the rowan tree; ants, also, and their eggs vary his diet, whence certain bears which habitually eat them are called ant-bears; and the more delectable honey, with the comb and larva, which he devours with keen zest, quite regardless, in his thick coat, of the infuriated bees. During the very dry, hot summer of 1868, when bruin's favourite feast of whortleberries failed him, he was constrained, said Norwegian papers, to quit his customary solitudes, and betake himself like a sturdy beggar or downright thief, to the vicinage of human dwellings, and there lay violent hands on anything devourable that came in his way; yet without doing bodily harm to man. When, however, the bear gets older, and once gains a taste of flesh, he thenceforth prefers it; and has doubtless a regal share of the six or seven thousand sheep, goats, pigs, horses, and horned cattle that are annually destroyed by wild beasts in Sweden alone. A bear may remain a considerable time upon a tract without its presence being particularly marked; but should it chance, either from spontaneous impulse, or outward irritation, once to kill a domestic animal, it is sure, unless prevented, to attack others in quick succession; lurking in the neighbourhood of the spot where the cattle graze, and watching its opportunity to start from its hiding-place upon any luckless cow

or heifer that strays from the herd, and striking it to the ground with a blow of its heavy paws, or clinging to its throat till it falls exhausted from loss of blood. The cattle, however, not unfrequently begin the attack, and receive the death-blow by rushing, with a loud bellow, upon the enemy whom one of them has chanced suddenly to espy.

The prodigious strength popularly ascribed to the bear is scarcely exaggerated; in reference to this, bear's sinew formed a constituent of the chain or cord by which the terrible Fenri wolf of Norse mythology was sought to be bound; and the Swedish proverb which asserts that Nallé (Bruin) does not smite with a twig, is true indeed. For with one blow of its massive club—its fore-paw—it can strike a heifer to the ground; and a bear, walking upright, has been known to carry a horse in his fore-paws across a timber-log placed over a rushing stream. The northern horse is not however so large as our own. In attacking animals it rears on its hind legs and striking with its chief weapons send their terrible claws deep into the flesh; but against man it more rarely assumes this position; creeping towards him, more usually, on all fours, as if awed by his glance, and making use of its teeth. When it would make prey of a horse, encountered on open ground, it usually fixes the claws of one paw in the horse's neck or breast, and allows itself to be dragged away till it can seize a tree to hold by with the other, or till the exhausted animal succumbs.

The bear has a good appetite; in the course of a day and night he can eat the most of a young heifer, beginning his repast even before the victim is quite dead. After satisfying his hunger he either buries the remainder of the meal or leaves it on the spot and returns soon. He will not, Pontoppidan states, like the sneaking wolf, feed on any dead carcase he chances to meet with, but likes meat of his killing, nice and fresh. Inwards, especially the kidneys, he seems to relish most; cow's-udder too is one of his choice bits, and it has often happened that a cow has come home to the seater in the evening with her udder torn off. Now and then, when it can surprise the vigilance of the wild reindeer it indulges in venison; and on the other hand, though not partial to fast-days,

"The grim, taciturn bear, the anchorite monk of the forest,"

partakes, for a change, when he can get it, of a dinner of fish. Sometimes he becomes unusually exorbitant in his demands; savage and surly beyond his wont. A peasant of Transtrand, the northernmost part of the wild province of West Dalecarlia, informed the present writer that in 1850 a monstrous bear infested the neighbourhood; tearing the roofs from byres and making sad havoc with the cattle within. Nor were the attempts to get rid of this violent marauder at all successful, till a peasant at length caught him red-handed, and having no weapon more effective than his tongue, conjured him with these awesome words: "If thou comest to me, thou Satan, I will dash thee against the wall;" whereupon the terror-stricken brute "no Christian bear" hurried away, and was not seen or heard of in the neighbourhood again. When a bear thus breaks into a cattle-shed, after slaughtering what he deems sufficient, if undisturbed, he always returns the same way, dragging with him, usually, a portion or the whole of his victim.

The bear, if let alone, is not greatly dangerous to man; who, under ordinary circumstances, may generally pass within view of him in the forest without serious occasion for alarm. But such an interview, during summer at least, is not often obtained; for the bear's acute senses—his quick hearing, sight, and scent give him timely notice of human approach, and he usually keeps out of the way. Even when wounded by the hunter's shot he more frequently flies than hazards a close fight. If, however, on such occasions, the bear does turn upon his foe, the hunter has the utmost need of cool nerve and a sure aim, or of a sharp weapon, wielded by a strong arm. Such encounters are most frequent with she-bears whose young have been shot or taken; but there are old, experienced he-bears also equally ready for a passage of arms. Heavy and clumsy as the bear appears when tamed, it is agile enough in the wild state; running more quickly than any man, and clambering up trees with facility, though it descends them, rear foremost, with great caution. It can swim with speed, but not very enduringly; its thick, shaggy, absorbing coat being necessarily an encumbrance in the water.

The bear, like the jettes, a giant brood of old saga, retreats before advancing cultivation, but is yet tolerably numerous in the more northerly parts of Sweden, where continuous forests cover hundreds of square miles; especially in the wilder parts of Wermland, Dalecarlia, and that vast, most northern, division of the kingdom called Norrland, which includes Lapland. When in Norra, Finskogen, Wermland, a few years since, the writer heard of a peasant hunter there who during one winter had shot ten bears in the forest tract. They are still more frequent in Norway, being found to some extent all over the country, right up to the Russian frontier; though very rarely and incidentally in the southern lowlands, and not very numerously in Finmarken, the northern extreme of the land, corresponding with the Swedish Lappmark, or Lapland. The forest and hill tracts of Thelemark, the whole province of Throndhjem, Österdalen, and Norrland, the most northerly province except Finmarken, are the localities in which he is now most extensively found. His favourite haunts are desert regions where pine-forested hills interchange with cloven rocks, wide stretches of moss, and mire, and grassy, herbaceous plots. From these elevated solitudes the northern king of beasts often takes a tour of longer or shorter duration over the open tracts of the higher mountains; but his proper domains are the dusky pine forests that stretch wide over the subordinate hills.

About the end of October, when the stringent winter of the North, with its attendant scarcity of food, begins to be felt in his high-lying and dreary realm, the bear altogether ceases to eat, and prepares a dormitory in which to sleep over the season of cold and dearth. This lair, *ide* or *hide*,* is usually in the deep cleft of a rock, under an old tree root, or in a pit which he digs for himself. Into such sheltered recess he gathers abundance of moss, ling, and spruce-twigs; and in November, with an empty stomach, lies down on this soft bed, rolled up usually in his thick, furry cloak, with his head between his hind feet, and resigns himself to a deep, oblivious sleep till the return of milder days. It is believed by the peasants that before commencing his long slumber he makes a two days' trial of the chosen site, to see that it is undisturbed and secure. Nor is sleep afterwards always unbroken; for though he sleeps hard while the cold continues extreme, and is quite sluggish if then disturbed, yet as spring approaches his slumbers are often so light that he awakes and takes to flight on the occurrence of the slightest noise, even when otherwise he would have enjoyed a long continuance of repose. If the prevalence of rainy or foggy weather has rendered his dormitory uncomfortably wet he will generally turn out for fresh twigs, or in quest of a drier site.

Eating nothing during the whole period of hybernation the bear wastes the flesh and fat previously accumulated; and though he continues in good condition till after Yule, is necessarily very lean and weak when, in April or May, he leaves his retreat. He then at first contents himself with lighter diet, such as ants and insect larvæ, but gradually taking more nutritious food, soon regains his normal weight and strength.

A month after the bear has left his winter lair he seeks a mate and the pair associate till into July. The female brings forth her young, in the lair, towards the end of January; she has from one to three, rarely four, at a birth, and though sometimes she eats nothing, she gives them suck. They give no early promise of future greatness and prowess, being only about eight inches long, blind and toothless; but they wax apace, and have already assumed importance when they quit their nursery in spring. The dam and cubs keep company till autumn; but if the former again becomes pregnant she will not allow the cubs to share her winter's retreat, and though far from full-grown they must learn to make a bed for themselves. In other cases the whole family lie together and continue to associate after again emerging from the lair; and sometimes do not entirely separate before the young are from three to four years old, and have founded families themselves.

(*To be continued.*)

* Related to the English *hithe*, a small haven.

ON MOUNTING SEEDS.

I SHOULD advise every possessor of a microscope, who has not already turned his attention to the examination of various seeds, to do so at the earliest opportunity, and he will readily admit, after careful study, how amply his labours have been rewarded.

It is my intention in this short paper to give a few hints which may be useful to the young microscopist, as to the easiest way of preparing seeds as permanent objects for the microscope, and also a list of the most curious and interesting.

Some seeds may be mounted dry, whilst others require to be put up in balsam; the first method being more simple than the latter, and may be used in all cases where the seeds are to be viewed as opaque objects, or are very transparent in themselves.

Before commencing you will require the following apparatus:

1. Wooden slides with hole in the centre.
2. Glass slips 3 × 1.
3. Thin glass in circles.
4. Small glass tubes.
5. Camel's-hair brushes.
6. Coloured paper for covering object slips.
7. Bottle of Canada balsam.
8. Bottle of turpentine.
9. Bottle of gum mucilage thickened with starch.
10. Bottle of cement made by dissolving shellac in naphtha.
11. Spirit-lamp.

Having these requisites at hand, you may at once proceed.

Suppose for example, you wish to mount some seeds as opaque objects. First take one of the wooden slides and gum a piece of cardboard over the hole in the centre, you will then have a kind of cell; in the middle of this cell paste a small square piece of cardboard, then paint the inside with Indian ink. When the paint is dry, brush over the square in the middle of the cell with gum, and place the seeds in various positions on it, and if placed near together, you will have a perfect square of seeds.

Wait then until the gum is dry: and I may here mention the advisability of having two or three slides in hand at once, so that time may not be wasted. After the gum is quite dry, proceed to lay on one of the circles of thin glass, which, of course, must be larger than the cell. Then dip a camel's-hair brush into the shellac fluid, and go round the edge, touching the glass and the slide at the same time. If this be done properly, the glass (when the shellac is dry) will be quite hard and fast to the slide. Some people, I know, fasten theirs down with small strips of paper; but I have always found the shellac to be just as easy, and to my mind more serviceable.

Nothing then remains but to finish off with ornamental paper, taking care to label it.

You will then have a very presentable and interesting object.

If the seeds are transparent enough to be viewed by transmitted light without being mounted in balsam, merely lay them on one of the glass slips, cover them with thin glass and cement down with the shellac as before. Finish off with coloured paper, or if you have a turn-table, run a ring of white lead varnish over the shellac; when this is quite dry add another: label and put away in your cabinet.

Mounting in balsam is somewhat more difficult to manage; but practice makes perfect, and we must not be disheartened by failure, but try again. The great difficulty seems to be in laying the covering glass down without the object shooting to the side, or air bubbles making their appearance. However, with a little care these difficulties will be overcome. The seeds should be allowed to remain for some time in turpentine previous to mounting.

Whilst they are soaking, clean one of the glass slips, and with one of the tubes transfer a drop of balsam to the centre of it. Then take the seeds from the turpentine and lay them in the drop of balsam on the slide. Hold the slide for a minute over the flame of the spirit-lamp until the balsam runs towards the edge, taking care that you do not boil it or spill it.

Have one of the covering slips ready; lay it on the balsam and lower very carefully. When you have it down quite level, and seen that no air bubbles have made their appearance, put it between the jaws of an American clothes' peg filed flat down for the purpose, and set it by to dry. I may here mention that it is necessary to keep the slips in a warm place, or else it will be weeks before the balsam is quite hard.

After waiting until the balsam is quite hard set, the slide may be cleaned with a rag dipped in spirits of wine and finally labelled.

The following are seeds easily obtained and worth mounting as opaque objects:

Anagallis, Anethum graveolens, Begonia, Carum carui, Datura, Digitalis, Elatine, Erica, Gentiana, Hyoscyamus, Hypericum, Linaria, Lychnis, Mesembryanthemum, Nicotiana, Campanula, Petunia.

The following as transparent objects in Canada Balsam:

Drosera, Hydrangea, Monotropa, Orchis, Parnassia, Pyrola, Saxifraga.

There are scores of others which are both beautiful and interesting, and I trust that many will be inclined this summer to add most of these to their cabinets.

Devonport. CHARLES H. DYMOND.

CATERPILLARS AND ONION-CROPS.—For several years past the onion crops in this neighbourhood have suffered severely from the ravages of the caterpillar of some insect. Can any of your readers suggest a remedy?—*P., Haslemere.*

NOTES ON *HYDROPHILUS PICEUS.*

By JAMES FULLAGAR.

A CORRESPONDENT asks whether the *Hydrophilus piceus* can be reared in captivity. It is my opinion that it cannot, as I do not think that the proper food of the larva is known. Perhaps the following remarks, with the sketches, will help him in obtaining the information he needs. On one very bright sunny morning in March, 1872, while searching for some subjects of natural history, I saw, basking in the sun, on some weeds at the surface of a pond, a very fine specimen of the female Hydrophilus, which I soon, by the aid of my net, transferred to my bottle. As soon as I reached home, I placed her in a glass vase, holding a gallon or more of water, in which was growing a quantity of duckweed, and other pond

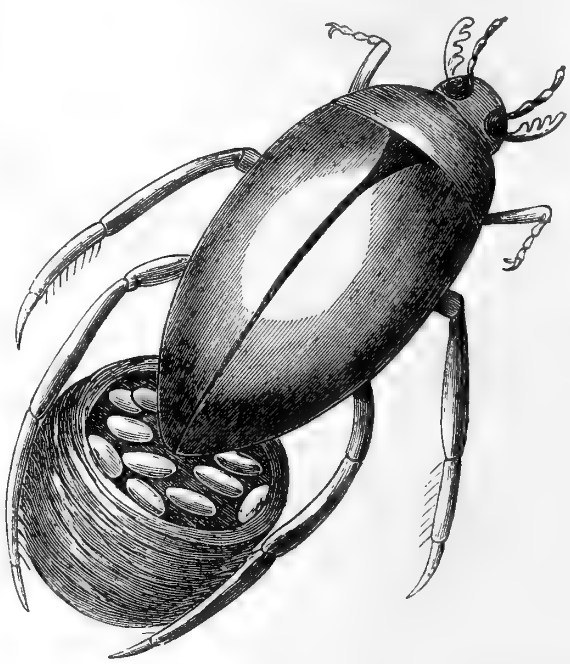

Fig. 115.—*Hydrophilus piceus,* in the act of depositing her eggs.

weeds. She went directly to the bottom and hid herself under the weeds. I often noticed her as I passed the vase, and on April 20, I observed that she had a quantity of white matter at the posterior end of her body, and I concluded, as she was at the surface of the water, that she was either dying or dead, but on examining her closely, I found that she was spinning a silken nest, or cocoon, and depositing therein her eggs. The nest was held firmly between the hind legs, as shown in the sketch (fig. 115). After the whole of the eggs were deposited, she covered them up, rendering the top gradually smaller and smaller, forming a sort of shaft, which, when the cocoon was disengaged from between her legs, floated at the top of the water, slightly attached to a piece of anacharis, with the shaft, or tube, in an upright position (fig. 116). When the cocoon was complete I removed it to a smaller glass of clear water, so that I could have a better view of the young when hatched. This I watched from day to day until May 15, when

I saw the young escaping from the cocoon. I counted twenty-five of them. They lived over a month, but I had not the proper food for them. From the form of the head and the formidable tusks, &c., I concluded that they were carnivorous, like the voracious larvæ of the circulation was visible. I made a large sketch of the larva, to enable me to show its form, and omitted the middle sections of the body, so that the head and tail only are shown (figs. 117, 118). I have now by me the empty cocoon. The sketch of the beetle and the cocoon are of the natural size, that of the larva is, of course, much magnified: the real length of the larva at a week old was half an inch.

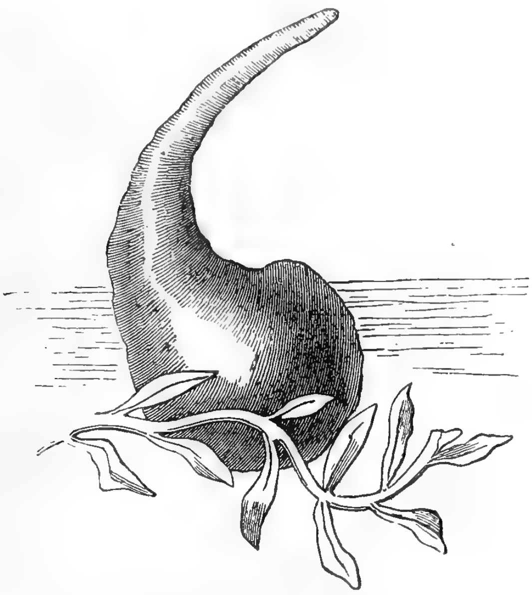

Fig. 116.—Nest or cocoon of Hydrophilus.

The following is from Maunder's "Treasury of Natural History," and would, perhaps, be interesting to your readers: "Hydrophilus, a remarkable genus of aquatic insects, differing from that of Dytiscus only in the structure of the antennæ, which, instead of being setaceous, are short, and furnished with a clavated and perfoliated tip or knob. One large species, common in our ponds and ditches, is an inch and a half long, oval, and of a deep brown colour, highly polished. The eggs are laid in a sort of cocoon spun by the female, and coated with a gummy matter which is impervious to water, on which it floats. The larvæ are observed to prey on the smaller kinds of water snails, tadpoles, &c., and appear very voracious; and they remain about two years before they change into pupæ or chrysalides. When the larva is arrived at its full growth, it secretes itself in the bank of the water it inhabits, and, having formed a convenient cell, lies dormant for some time, after which it divests itself of its skin, and appears in the form of a chrysalis; in this state it remains some time longer, when it again releases itself of its exuviæ, appears in its complete or beetle form, and as soon as the elytra or wing-cases acquire a sufficient degree of strength and colour, it comes forth from its retreat, and commits itself in its new form to its native element. It is a curious circumstance that some of the species of Hydrophilidæ found in this country exceed in size those from tropical climates; many of the species are, however, very minute."

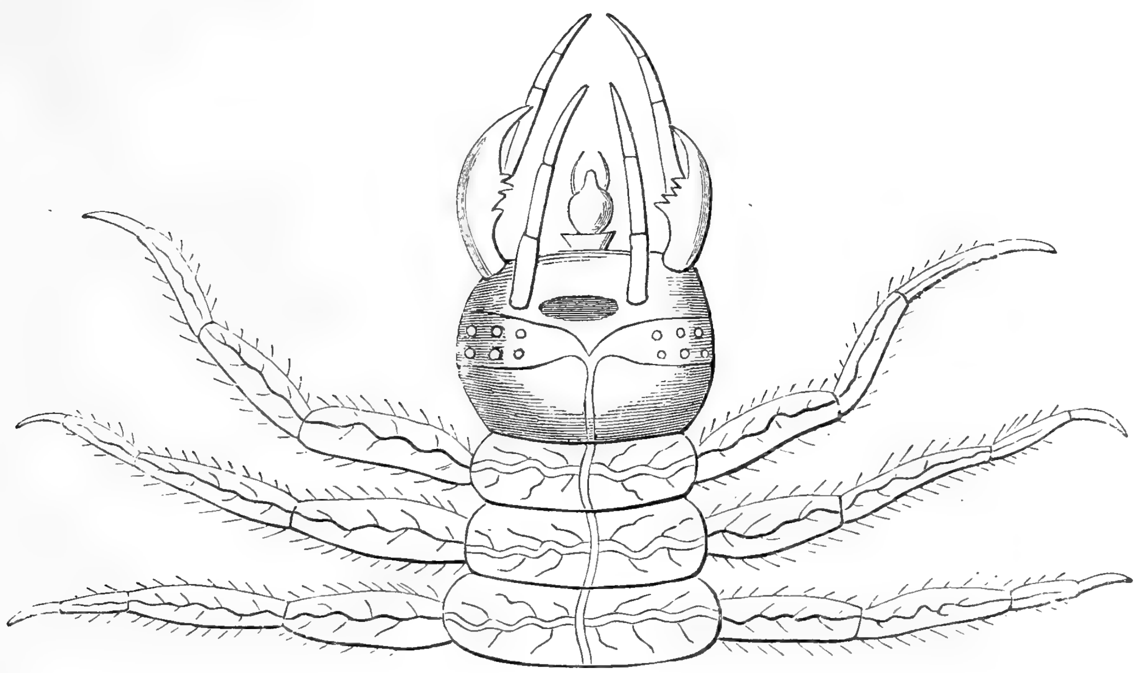

Fig. 117.—Head of larva of Hydrophilus (mag.).

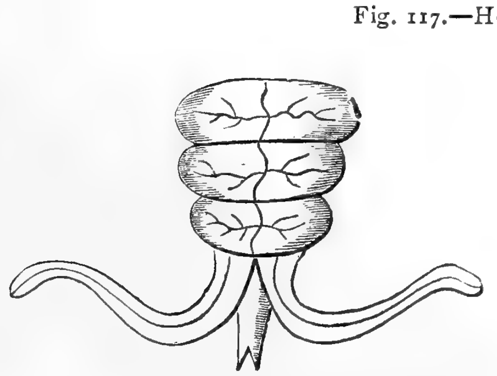

Fig. 118.—Tail of larva of Hydrophilus (mag.).

Dytiscus marginatus. The young larvæ were very transparent, and the circulation in every part of the body was plainly seen, and formed a beautiful object under the microscope when placed in a very shallow cell; even up to the end of the curved tail appendages

MICROSCOPY.

Mounting in Canada Balsam. — Being an amateur mounter I took an interest in Mr. Underhill's article in last month's number of Science-Gossip on the "Preparation of Insects for Microscopical Examination," and have no doubt that by the time this series of articles is concluded I shall have obtained many useful hints, but at the same time I think I can myself give a few hints in return, particularly with respect to mounting in Canada Balsam. Mr. Underhill advises the use of test-tubes, in which to keep the Canada balsam. I have never used test-tubes myself, but cannot believe they are either so handy or cleanly as two-ounce wide-mouthed capped bottles, to be obtained at 1*s.* each. The balsam is applied by means of a small brass rod drawn to a point, and always kept in the bottle ready for immediate use; a knitting needle will also answer this purpose, but will require cleaning occasionally. If, however, very large covers are used, I would then advise a glass syringe, as recommended by Dr. Carpenter.

Then again, I cannot say I like the use of clips, and never employ them if I can possibly help it. The pressure of the clip causes the covering glass to "dish," and when the clip is eventually removed the cover springs back to its original position, causing a suction all round the edge, and in case of "fluid" mounts a running in of the cement; an apparent shrinkage taking place when balsam is used, but this is easily remedied.

When mounting in fluid I prefer to have the cell quite as deep as the object, and when the cover is put on, if the superfluous fluid be removed by means either of bibulous paper or a damped camel's-hair brush, it will be found that the cover is held down by suction sufficiently firmly to enable a very thin coat of cement on and just over the edge, to be dabbed on by means of a brush; when this cement is dry the slide can be further washed, as directed by Mr. Underhill, and extra coats of cement applied by means of the turn-table.

I doubt if balsam would ever set without some heat, but at the same time I think it very risky to apply heat by means of a lamp. My own method is to mount without heat, and after the lapse of a day or two to place the slide upon the top of a hot-water cistern for a bath, the heat of which can be moderated as desired by means of slips of wood placed under the slide, which will have to remain there for a week or even longer, according to the size of covering glass and thickness of balsam.

I could say a little on "coaxing" air-bubbles out of Canada balsam; there is a knack in getting rid of these pests. In many cases, however, the bubbles are merely vapour of benzole, and will disappear spontaneously in the course of half a day or so, being re-absorbed by the balsam.—*H. M.*

The Thallus of Diatoms.—In a recent number of the "Journal de Micrographie," Dr. M. Lanzi has a note on this subject, in which the thallus, or gelatinous stem or stipes, of certain species of diatoms is carefully delineated. These gelatinous stems, he says, are produced by the accumulation of plasma within the cells, which takes place to such an extent as to issue from the pustules. This plasma plays the part of an organ of vegetation, and therefore does not properly afford either by its presence or absence any distinction of species. It may furnish nutriment to the young diatoms, or even may serve to distribute the species by dividing into parts, which are carried off by the water. Dr. Lanzi thinks that all genera founded upon the character of the thallus and its form should be abolished.

Microscopic Organisms in Blood.—Under the title of "The Microscopical Organisms found in the Blood of Man and Animals, and their relation to Disease," Dr. T. R. Lewis, of the Army Medical Department, and who is also Special Assistant to the Sanitary Commissioner with the Government of India, has published another small quarto work of about ninety pages. It describes the various vegetable organisms found in blood during splenic fever. Pneumo-enteris of the pig, recurrent fever, &c.; the relation of microphytes to disease; vegetable organisms in healthy blood; spirilla and their supposed relation to disease; protozoa in blood, such as flagellated organisms, nematoids and their embryos, *Filaria sanguinis-hominis*, &c. This is one of the most thoughtful of Dr. Lewis's works.

Effects of Starvation.—From the office of the Superintendent of Government printing, in Calcutta, there has just been issued Dr. Cunningham's report on "Certain effects of Starvation on Vegetable and Animal Tissues," in which we have detailed from microscopical examination, and experiment, the full effects of a deficient supply of nutritive material both on animals and vegetables. In the latter this is chiefly manifested by the growth of microscopic fungi. The chapter on "Phenomena observed in the post-mortem examinations of cases of famine—diarrhœa, and dysentery," is a most valuable essay to Indian pathologists particularly. We hope Dr. Cunningham may be able to continue his important researches with the same success as heretofore.

The Colour of St. Paul's Cathedral, etc.—Last year Professor Paley contributed an article to Science-Gossip suggesting that the dark colour of the stone-work of St. Paul's and other churches might be due to organic agency. No answer was given to his queries. The "American Quarterly Microscopical Journal" states that Professor Leidy finds that the black or smoky colour found on old walls in narrow shaded streets is caused by an alga closely resembling *Protococcus viridis*. It may be this plant in a particular stage, but Professor Leidy

has provisionally called it *Protococcus lugubris*. The specific name suggests that even microscopists are not deficient in humour.

"The American Quarterly Journal of Microscopy."—Since the cessation of the publication of the "Lens," until October, 1878, microscopy in America was only represented by the unpretentious little "American Journal of Microscopy." This, like our own Science-Gossip, aimed at giving accurate information, divested as far as possible of scientific technicalities. It was, however, felt by the leading microscopic workers in that country that a journal of a higher scientific standard was desirable, and some nine months ago the first part of the above-named journal made its appearance. With the exception of a few typographical errors it was well printed and illustrated, and contained much valuable original matter. We have just received the third part and perused its contents with much pleasure. The various papers are the productions of men who are well acquainted with the subjects on which they have written. The contents may be thus enumerated:—two histological papers: "The Ampulla and Pancreatic Ducts in the Domestic Cat" (continued), by S. H. Gaze; a case of "Tubercular Meningitis," by P. J. N. Danforth. Two botanical: "The Structure of Ophioglossum," by Prof. M. Harrington; "Dubious Forms of Freshwater Algæ," by the Rev. Francis Wolle. Three mechanical: "The Formation of the Paraboloid as an Illuminator" (in which he tells us "How it is Done"), by F. H. Wenham; "A few Remarks on Angular Aperture and Description of a Universal Apertometer," by Prof. H. L. Smith; Two forms of "Comparators for Measures of Length," by Prof. W. A. Rogers. One on mounting: "Practical Hints on the Preparing and Mounting of Animal Tissues," by Dr. Carl Seiler (continued). One infusorial: "The Simplest Forms of Life," by E. Eyfurth. The two first are perhaps too technical for the general reader; the remaining papers will, however, be found interesting to the microscopical student. Mr. Wenham's paper on the "Formations of the Paraboloid" contains minute directions for the construction of that very valuable accessory. The article commences with a reference to a paper read before the Microscopical Society (now the R. M. S.) in 1856, in which he proposed a right-angled prism, connected to the under surface of the slide by a fluid intermedium which transferred the total reflecting surface from the prism to the top plane of the cover. We quote the following paragraph (p. 187), with which our readers will cordially agree: "It is to be regretted that in this country the noble art of mechanical construction should be held in such low esteem as not to be considered a worthy element of education enabling persons to carry their own ideas into practice without being stopped by heavy artisan's bills." We supplement this by remarking that it is also to be regretted that but few will take the trouble to learn, even theoretically, the principles upon which the microscope and its accessories are constructed. Professor Smith's paper will commend itself to those who are interested in the possible angle of aperture of objectives. Those who have turned their attention to micrometric measurements can appreciate the difficulty of subdividing a unit accurately; we have also the difficulty of obtaining some trustworthy division of the inch, or the centimetre, with which to compare the micrometric divisions, but supposing this obtained we rarely find that divisions on the micrometer are of equal value. Professor Rogers gives a table of measurement of 50 spaces made with the most accurate appliances obtainable, and only in one instance do the errors correct each other, the largest average amount of error was found to be $\times \frac{25}{100000}$ inch. For ordinary work the slight errors in the division of the micrometer are not of more importance than an error of $\frac{1}{50}$ inch in the length of a carpenter's rule, but when the value of important evidence (as in ascertaining the source of blood-stains by the average diameter of the discs) depends upon perfect accuracy, our readers will see how necessary it is that our measuring instrument should be absolutely free from error. Dr. Carl Seiler's paper is continued from the previous number, and contains some valuable hints on the preparation, staining, and mounting of animal tissues. For the purpose of staining, the writer recommends the sulphindigotate of soda, "the effect of this mode of staining is to leave the nuclei bright red, while the formed material of the cell is slightly tinged with blue. The connective tissue fibres become stained with a deep blue cover, while the blood vessels are purplish and mapped out with surprising distinctness; epithelium and hair take this staining in a very curious manner, inasmuch as the cells of different ages take different colours, varying from a brilliant emerald-green to purple, violet and olive-green." Excepting in a few special cases, Dr. Seiler prefers a solution of Canada balsam, prepared according to Dr. J. T. Woodward's formula, as follows: "A clear sample of Canada balsam is evaporated either in a water bath by artificial heat, or better by placing it in a shallow dish and exposing it to the heat of the sun until it becomes hard and brittle throughout when cold, and until all odour of turpentine has disappeared when warm. This resinous balsam is then dissolved in warm absolute alcohol to the consistency of thin syrup and filtered through flannel. If by accident the balsam has become brown during exposure, the alcoholic solution may be bleached by exposure to sunlight.

"The advantages of this material are that it soon becomes hard round the edges of the cover, and can be scraped off to finish the slide; that it never crystallises, as other resinous mounting media frequently do, and that it improves the appearance of the object by age.

"The author gives the following recipe for a cement to be used for fixing the covers on glycerine-mounted slides, and which he says is glycerine proof.

"Cox's gelatine, ʒii; acetic acid, fl. ℥i; gum ammoniac, gr. x. Dissolve in a water bath, and filter through cotton while warm. This cement remains fluid when cold and dries quickly. After the ring has become set or stiff, the whole slide is immersed for a minute or so in a 10-grain solution of bichromate of potash, and is then allowed to dry, exposed to the light, which makes the bichromated gelatine perfectly insoluble even in boiling water, and thoroughly prevents the escape of any glycerine."

This very ingenious method of employing bichromated gelatine can be used for most fluid-mounted preparations, and we have no doubt that where soft balsam is used, it would form a very good foundation for the coloured cements now so generally employed, and effectually prevent their "running on." We cordially recommend this journal to those interested in microscopical studies, and advise all microscopical societies to add it to their libraries. This work in conjunction with the Transactions of our own Royal Microscopical Society will keep the members posted up in the latest microscopic news.—*F. K.*, F.R.M.S.

EUGLENA VIRIDIS AND HYDRATINA SENTA.—Your answer to M. H. Robson anent the *Euglena viridis* leads me to mention the following circumstance. A little while ago, I obtained a sample of water from a pond literally green with swarms of what was, to all appearance, the *Euglena viridis*. Careful examination of them, however, engendered a doubt in my mind as to their identity with the true Euglena, for I discovered that the flagellum was in each case *bulbed*. I put the water aside for about a week; on again examining the objects, I was rather surprised to find that the Euglena (?) had nearly all disappeared, their place being taken by the common Funnel Rotifer (*Hydratina senta*) in various stages of development. This circumstance seemed to confirm my previous suspicion, and favoured the notion that the objects first observed were not the true *Euglena viridis*, but were the larvæ of the *Hydratina senta*. Has Mr. Robson or others noticed any such metamorphosis in the specimens? If so, will not the *bulb* serve as a feature whereby to distinguish the true Euglena from other objects of similar shape and colour?—*F. Jas. George.*

THE FUR ON THE TONGUE.—A singularly interesting paper has been read before the Royal Society, by Mr. H. Trentham Butlin, F.R.C.S., on the above subject, in which he showed that the so-called "fur" is in a great measure due to the glœa of certain forms of microscopical fungi. In order to ascertain the true nature of glœa, and to obtain it in a purer form, it was cultivated upon a warm stage. Several fungi were then discovered, but only two kinds were present in every experiment, viz., *Micrococcus* and *Bacillus subtilis*. As the glœa produced artificially was similar to that existing naturally in the tongue fur, Mr. Butlin believes that "fur" is composed essentially of these two fungi. Micrococcus developed freely and abundantly, forming large masses of yellow or brownish-yellow colour. Bacillus did not develop, but existed in greater or less abundance in all the cases examined. Mr. Butlin thinks that one cause of its artificial non-development may be the presence of other developing organisms, and that development takes place freely upon the tongue. Its habitual occurrence there, and the presence of spore-bearing filaments favour this view. Besides the above, other fungi were present, as *Bacterium termo*, *Sarcina ventriculi*, *Spirochæta plicatilis*, *Spirillum*, etc.

ON CLEANING OLD SLIDES MOUNTED IN BALSAM.—Having seen a great deal lately about cleaning old slides in your columns, it has occurred to me that the method I use might be serviceable to some. The process is as follows: I first heat the slide over a spirit-lamp until the balsam is soft, then I scrape the covering glass off, and as much balsam as possible. I let it dry and chip off all I can with an old knife; and when I have taken it off, I soak a rag in turpentine and rub the slide well with it (renewing the turpentine when necessary) until all the balsam is removed, which it is in a very short time.—*H. C. Bristowe.*

ZOOLOGY.

NOCTURNAL SONG OF BIRDS.—There have appeared from time to time in SCIENCE-GOSSIP inquiries concerning birds singing by night. On the third of last month (May) a thrush was heard singing long and loud after 10 P.M. a little way out of this town, on the Tring Road.—*J. W. Slater, Aylesbury.*

AERATING AQUARIA.—Dr. Lenz, of Lubeck, has devised a method of aerating the water in an aquarium. A tube conducting the air to the bottom is expanded at the end and stuffed with fine sponge, which causes the air to rise through the water in very minute bubbles.

THE "SCIENCE INDEX."—We have received the first part of a new publication bearing the above name. It is edited by Mr. A. Hildebrandt, and published in Manchester, and professes to be a "monthly guide to the contents of the scientific periodicals." Such a work is much needed, and the "Science Index" promises to fulfil the duty well, in spite of some errors in the first part, which are evidently due to the haste with which it has been got out.

MALE EELS.—In the "American Naturalist" for May, Professor Packard announces the discovery of *male* eels. At first they were supposed to be immature females, but the question is now finally settled,

for out of one hundred and ninety-three eels supplied by the United States Fish Commission three have been found to be males. Professor Packard found the nucleated spermatozoa in the cells.

BOAR-FISH (*Capros aper*, Lacép.).—Numbers of these fish have been thrown up on the beach here during the present month (April); I have had thirteen specimens brought to me, all of which are very uniform in length, viz. 5 to 5½ inches. No transverse bands were visible in any of them, but the general rosy-pink colour was very vivid in most. I observe that some of your correspondents refer this fish to the genus *Zeus* (Linn.), but there are very marked distinctions between the genera *Zeus* (Linn.) and *Capros* (Lacép.).: e.g. in the former the body is without scales, and the first dorsal carries a series of long filaments; there is also a row of spinous scales at each side of the base of the dorsal and anal; whilst in *Capros*, the body is clad with scales, and there are no filaments to the dorsal and no spines at its base. I wish one could discover some preservative fluid that would conserve the colour in fish; few would realise, in looking at the pale specimens in the jars the exquisite rosy tint of the living fish. For the benefit of fellow-readers of SCIENCE-GOSSIP who preserve fish, I may mention that after trial of many preservative fluids, the one I find handiest and most useful is Burnett's fluid (chloride of zinc) largely diluted: i. e. 1 part of fluid to 20 of water. This solution is slow in evaporation, and of course does not crystallize about the mouth of the jar or bottle. I believe it is the fluid used in the British Museum for preserving fish.—*E. B. Kemp-Welch, Bournemouth.*

MISTAKES OF INSTINCT.—I desire most cordially to support the suggestion in your April number, to study the aberrations of instinct, as a means of arriving at a more intimate knowledge of the normal workings of that faculty. It is in fact the proper application of the philosophical axiom "Exceptio probat regulam" in its true sense. It is analogous to the study of monstrous forms in animal or vegetable structures (Teratology) in order to arrive at a knowledge of the mode in which the ordinary forms are produced. I would instance the *Arum Dracunculus* (the dragon flower) the flowers of which when fully expanded have a smell very much resembling that of putrid meat, and I have often noticed the multitude of flesh-flies that buzz and hover about the plant when in flower; attracted, as is very obvious, by the odour of the blossom. I learn from a notice in your April number, that Cuvier has stated that flies are so far deceived by it, that they actually lay their eggs in the floral envelope.* I have never yet observed this myself, but I have a plant in my garden, which in a short time will be in flower. And I will carefully watch it, and if I find that any of the multitude of flies that visit it have laid their eggs in it, I will send the piece so operated upon to you, as a tangible proof of a decided mistake of instinct, in a matter of the utmost importance to the creature, and conclusively shewing that in this particular instance the animal is guided by the sense of smell alone, and does not correct its inferences by the application of sight or touch or any other sense to the object.

Probably anglers could do good service in this direction, if they would carefully observe, and note, under what circumstances fishes are most readily deceived by, or reject the allurements of artificial flies. Is there any reason to believe that they are guided by any other sense than sight, in snapping at the sometimes not very close semblance of a dainty morsel? Another instance that occurs to one is the common case of a hen being induced to sit upon a chalk egg; where sight and touch appear to combine to delude the poor creature. The point requiring observation, I think is—do not all the observed aberrations of instinct arise from mistaken sense? Is there any observed instance shewing that the creature is able to correct a mistake of sense, by the application of any other faculty, and if so, what is that corrective faculty?—*C. B.*

* See Taylor's "Flowers: their origin, shapes, perfumes, and colours," page 261.

BOTANY.

FUNCTION OF NECTARIES IN PLANTS.—It is stated in the "Times" of April 8, that the theory of the functions of the nectary has recently been called in question by M. Bonnier, in support of which he gives various arguments. I was so much pleased with the (to me) convincing proofs adduced in "Flowers," by the Editor of SCIENCE-GOSSIP, that I hope his opinions, which are in accordance with those of Darwin, Müller, and others, will be confirmed by the discussions that will no doubt take place, refuting M. Bonnier's difficulties and objections, by botanists who have given attention to the subject; and I trust that some of them may appear in SCIENCE-GOSSIP.—*T. B. W., Brighton.*

CORN COCKLE (*Lychnis* or *Agrostemma Githago*). In January 1878, I received a few specimens of this plant from my friend Mr. J. Leighton, so much smaller than the ordinary form that I was not sure whether to consider them a new variety or merely starved specimens. So I sent one or two to Dr. J. T. Boswell for his opinion, and he kindly informed me that they were probably starved plants of *L. Githago*, and that if their seeds were sown in good soil they would doubtless produce the typical form. So I labelled my mounted specimens as a "starved form of *L. Githago*." But as Mr. Leighton in November last again forwarded me precisely similar examples from the same locality gathered last season, I wrote to him that the plant might perhaps be a new variety,

and suggested the provisional name of *parvula*, to distinguish it in the meantime from the common form. Dried specimens differ in the following particulars:—*L. Githago:* stem branched 2 to 3 feet high; calyx segments nearly twice the length of the petals; flowers purple, whitish within the throat. *L. Githago var. parvula:* stem simple, 3 to 5 inches high, calyx segments equalling or shorter than the petals, flowers bright red. The difference in the colour of the flowers may have occurred in drying. The locality given for the plant is "near the Grand Stand, Epsom Downs, Surrey," and it might be worth while for some of our southern botanists to try and procure its seeds during the ensuing summer, see if it retains its characteristics when cultivated, and give the result of their experiments in the pages of SCIENCE-GOSSIP.—*D. Douglass.*

TERATOLOGICAL NOTES.—From observations made in my own garden, I am far from thinking synanthy commonly the accompaniment of decaying vital energy in the plants on which it occurs. Last spring I had a polyanthus which, after bearing a profusion of bloom, produced a flower with two pistils, each of them having a distinct style and stigma. This plant is now alive and vigorous in full bloom, many of its flowers being on long pedicels, growing singly like those of the primrose, others being in umbels on erect peduncles, as is usual in the polyanthus; and with nothing at present like that exceptional flower of last year. I have, however, now in bloom, several healthy, vigorous plants of polyanthus bearing synanthic flowers of which all the organs are double the number found in nominal flowers: from the calyx with ten teeth to the two long styles with well-developed stigmas, of which I enclose a specimen. All these flowers are pin-eyed, and most of them such as a florist would destroy. Indeed, I think that if botanists would pick up what gardeners throw away, and cultivate worthless varieties of popular flowers, they might know much more of teratology than many of them do.—*John Gibbs.*

A SHOWER OF POLLEN.—A remarkable shower of pollen grains fell in the north-eastern part of Pennsylvania on the morning of March 17, which covered an area of more than 2500 square miles. It is believed to be chiefly the pollen of *Pinus Australis* of the Southern States, and that it had been carried by the wind a distance of 500 miles. The country people took it for a "shower of sulphur."

YEW-TREES AND CATTLE.—With reference to this matter I beg to state that two stirks, the property of the Rev. D. Bonallo, Blackford, were found dead in the byre one day last week (end of April). It was discovered that they had devoured some cuttings of yew, which had been carelessly thrown out of the shrubbery into the meadow in which the cattle were grazing.—*R. Donaldson, Glasgow.*

GEOLOGY.

THE SILURIAN DISTRICT OF RHYMNEY AND PEN-Y-LAN, CARDIFF.—This is the subject of a paper recently read before the Geological Society, by W. J. Sollas, F.G.S.

The paper commences with a history of the previous observations on the district; a description of the geographical distribution, geological structure, and vertical succession of the Silurian rocks is next given. They comprise beds belonging to the Wenlock and Ludlow groups, and pass conformably upwards into the Old Red Sandstone. The district affords a good base for a measurement of the thickness of the Old Red Sandstone on the south of the South-Wales coalfield. This was found to be a little over 4000 feet. The thinning out of the Old Red Sandstone and Silurian strata, together with the marked change which takes place correspondingly in the lithological characters of the latter formation on passing from the north to the south side of the coalfield, were taken to indicate an approach to a shore-line. The shore-line belonged to land which, as shown by the great thickness of the Devonian beds, could not have extended far south. It corresponded to Mr. Etheridge's barrier between the Old Red Sandstone and Devonian seas. The sandstones with Old-Red characters, such as the Hangman Grit and the Pickwell-Down Sandstones, occurring in the Devonian formation, were deposited at intervals when this barrier was submerged to a greater depth than usual. The Cornstones were stated to thin out to the south along with the other sedimentary beds of the Old Red Sandstone, and were regarded as derived from the denudation of previously upheaved limestones, such as the Bala and Hirnant.

AN INDIAN MIOCENE APE.—The skull of an anthropoid ape, an adult female, which must have been as large as a female gorilla or orang, has been found in the Siwalik rocks of the Punjab by Mr. Theobald, of the Indian Geological Survey. It is the first of its kind found in India which bears a resemblance to existing apes; and this animal must have been as distinct as the gorilla and the chimpanzee, or any other two types of ape. It is proposed to call it *Palæopithecus.*

POST-GLACIAL ANIMALS IN LONDON.—Fossil remains of various extinct animals have been recently found in London, in making the excavations for Messrs. Drummond's new bank at Charing Cross. They include elephant tusks and molars, probably the mammoth *Elephas primigenius*, teeth and numerous bones of the gigantic extinct ox (*Bos primigenius*), a portion of what appears to be the horn of the great extinct Irish deer (*Megaceros Hibernicus*), along with various other remains of ruminating animals not yet identified. All the remains are those of herbivorous quadrupeds, but

there is among them no bone or tooth of hippopotamus or rhinoceros, though these animals are known, from discoveries made at Brentford, Crayford, and other localities in the Thames Valley, to have been in post-glacial times the companions of the Thames Valley Mammoths.

"CONODONTS," ETC.—At a recent meeting of the Natural History Society of Glasgow, Mr. John Young, F.G.S., exhibited a series of conodont remains and sponge spicules from the Silurian and Devonian limestone strata of England, forwarded by Mr. John Smith, Kilwinning. Mr. Young stated that at a former meeting Mr. Smith had sent for exhibition an interesting series of conodonts and various forms of sponge spicules, which he had found in the limestone strata around Dalry, Ayrshire. Since that time he had visited several districts in England, and had been successful in discovering the remains of conodonts in some of the weathered shales and limestones of the localities he had visited, these not having been formerly noted as occurring either in the Silurian or Devonian formations of England. Very little is yet known of the nature of the organisms that have yielded these conodont remains, which consist of small teeth, joints, &c., of many different forms, one party referring them to the jaws of Annelids, another to that of Myxinoid fishes, to the lingual armature of certain forms of Molluscs or the maxillipeds of Crustacea. As new localities are turning up where these interesting though obscure forms are being found, it is to be hoped that more light will soon be thrown upon the true nature of the organisms to which they formerly belonged.

HISTORY OF MINERAL VEINS.—Mr. John Arthur Phillips, F.G.S., in a paper on this important subject, read before the Geological Society, described the phenomena of the deposition of minerals from the water and steam of hot springs, as illustrated in the Californian region, referring especially to a great "sulphur bank" in Lake county, to the steamboat springs in the State of Nevada, and to the great Comstock lode. He noticed the formation of deposits of silica, both amorphous and crystalline, enclosing other minerals, especially cinnabar and gold, and in some cases forming true mineral veins. The crystalline silica formed contains liquid-cavities, and exhibits the usual characteristics of ordinary quartz. In the great Comstock lode, which is worked for gold and silver, the mines have now reached a considerable depth, some as much as 2660 feet. The water in these mines was always at a high temperature, but now in the deepest mines it issues at a temperature of 157° Fahr. It is estimated that at least 4,200,000 tons of water are now annually pumped from the workings; and the author discussed the probable source of this heat, which he was inclined to regard as a last trace of volcanic activity.

ANCIENT PRAWNS.—Mr. Robert Etheridge, jun., F.G.S., has announced the discovery in the Lower Carboniferous bed of the south of Scotland, of a long-tailed decayed crustacean, or prawn, which he has very properly named after Dr. Henry Woodward, *Anthrapalæmon Woodwardi.* Another species of *Anthrapalæmon* was named *Macconochii*, after its discoverer.

NOTES AND QUERIES.

INTELLIGENCE IN MAN AND ANIMALS.—"Idea" hopes to see a more intelligible distinction shown between instinct and reason, though by the context he evidently appreciates that there is a difference, and compares instinct in animals with impulse in man. By instinct I understand that intelligence with which animals are endowed, which causes them to act in a uniform manner without experience. Thus, for example, the beaver, the ant, and the bee, build their homes on a regular, and, so to speak, systematic plan, without, as far as can be learned, being taught by their progenitors. They have also an innate dread of their enemies, which appears to exist independently of experience. The origin of reason, as has been pointed out by Mr. P. Q. Keegan, is the subject of dispute by different schools of metaphysicians, which will apparently always be the case. We all, however, possess the faculty in some degree, and its practical workings are therefore pretty well understood. Even if it be granted that animals reason to a limited extent, the question arises, Is there no difference between man's reasoning power and that of the lower animals? The arguments of those who maintain that the intelligence of animals differs from that of man only in degree, are summed up in an assertion Darwin makes in "The Descent of Man:" "Since animals possess the same senses, it follows they must possess the same fundamental intuitions as man." That man derives all his ideas from the senses has been disputed by so many writers of great capacity, that it would argue some presumption to consider it an axiom. As the concise proposition cannot be proved, it may, however, be true, and, if so, it follows, if Mr. Darwin's argument is sound, that all animals, without exception, which possess the same senses as man, are possessed of the fundamental intuitions. Why, then, does he draw a distinction between instinct and reason? and between conscious and unconscious intelligence? for proof of which see my letter of March, with quotation; and why, moreover, does he draw a distinction between the primates and the lower animals? The accounts of the actions of ants, as described in the "Origin of Species," and more recently by Sir John Lubbock, are more extraordinary than those of an ape. The brain of the ant is said to be large in proportion to its body, but it is infinitesimally small when compared with that of the ape. With regard to the anecdotes of animals in Mr. Darwin's work, and those which have lately been discussed in "Nature," we arrive with certainty at one conclusion, viz., that more than one explanation may be given of them. Those who argue that the intelligences of man and animals differ only in degree, have to prove, not only that animals agree in some parts of their mental powers with man, but in all; and here the distinction drawn by Mr. Henslow in "Nature," February 27, has to be explained between man's abstract reasoning powers and the reasoning of animals from objects present to the senses, which, it appears to me, has not been controverted. Here is one difficulty. Then with

regard to the imagination. Mr. Darwin derives the faculty from dreams, and observe that animals dream. Dreams are explainable by the theory generally accepted, that when we are asleep our intellect is partly awake, and when we are awake it is partially dormant. Doubtless the savage may occasionally mistake dreams for realities, though one would suppose their constant occurrence would familiarise him with the phenomenon. Surely this is a very slight basis on which to establish the origin of the faculty so marvellous as the imagination. That animals possess memory, attention, and sympathy, cannot be disputed. Will Mr. Rogers or Mr. Wheatley explain why they think "memory an act of reason?" How do they reconcile the assertion with the fact that idiots often possess marvellous memories? J. E. Taylor remarks on the mistakes made by animals, which he thinks may throw much light on animal psychology, and his letter suggests to me that the favourite method of illustration with the Darwinians is to compare the lowest savage that can be found with the most intelligent quadruped, and then remark that there is little or no difference between them, overlooking the fact that one is capable of development to an immense extent, and the other but to a limited degree. With regard to these cases of mistakes by animals, many swimmers must be aware that, when in the water, it is often difficult for them to keep their dogs off, they appear to wish to rescue their masters, and they do not always know their own masters when naked. I have known instances of naked persons being in danger from a dog and a cat, and I am informed that the maternal yearning of a cow that has lost its calf may be entirely satisfied by a skin stuffed with straw. There are also many instincts to which we have no clue whatever. All these must be explained before it can be conceded that the minds of animals and man differ only in degree. Turning for a moment from the mental to the physical question, which inevitably suggests itself, we find that Mr. Darwin compares the fœtus of a man, a monkey, and a dog, and remarks that at an early stage of development they are apparently the same, and argues from this resemblance that they must have had a common progenitor. Despite this seeming resemblance, however, there is the indisputable fact that they develope into a man, a monkey, and a dog. Surely, if this proves anything, it proves the danger of reasoning by analogy, and Mr. Darwin's arguments are of this nature. The appearances explained by the law of reason may be as fallacious. I am not in the least prejudiced against the Darwinian hypothesis; whatever the conditions of our existence we must perforce submit to them; the question for me is, Can it be confirmed by facts? but no thinker can disregard the instinctive disgust with which it is regarded by many persons of all degrees of cultivation.

What do the evolutionists, who argue that some supernatural change may have taken place in the reason of man, mean by the word supernatural? If they mean some law not as yet discovered, why do they not suspend their judgment? If they mean a direct interference of the Deity, it is a purely speculative idea, without proof of any kind. We are not bound to explain the origin of species, or of man, but we are bound to examine any explanation that may be offered under penalty of being led on a delusive voyage of discovery. Much first-rate talent is being spent on deductions from the Darwinian hypothesis. What if the premisses are false? The finite cannot comprehend the infinite; so far I agree with your correspondent, C. L. W., but when he deduces from this fact that "man may consequently be in error when he assumes that he alone is the possessor of reasoning powers," he suggests on this basis an assertion that may or may not be true. In my letter, in the April number, the words "the same kind of intelligence" are a misprint for "some kind of intelligence," the reverse of my meaning.—*H. D. Barclay.*

Intelligence in Man and Animals.—Mr. Wheatley quotes (from "Nature") a "remarkable instance of rats gnawing leaden pipes in order to obtain water, and which Dr. Darwin explained by saying that the rats heard the water trickling, and reasoned about it, and cut through the pipe to obtain it. I think this explanation probable." I believe it to be in the highest degree improbable. In this city the pipes are always full, and consequently no sounds of "trickling" could be heard; yet I know of more than one instance of pipes being gnawed by rats and *mice*, even the pipes conveying gas are sometimes bitten through, of which an instance came under my notice a few days ago. I think a much simpler explanation can be given than that the rats detected the presence of water and reasoned upon it, viz., that the pipes happened to be in their way.—*F. Killon.*

Intelligence in Animals.—"It is quite clear" (says Dr. Whately) "that if such acts were done by man they would be regarded as an exercise of reason, and I do not know why, when performed by brutes, evidently by a similar process *so far as can be judged*, they should not bear the same name. To talk of a cat having *instinct* to pull a bell when desirous of going out at the door . . . . would be to use words at random." And I think many would agree with the learned archbishop if they would carefully read the testimony and researches of such eminent naturalists and thinkers as Lockslie, Bacon, Burns, poet; Professors Darwin, Huber, Brehm, Rengger and Kirby; Cuvier, the naturalist; J. K. Lord, Lubbock, and the lately recognised genius, Edward, of Banff, &c. As an example, of which so many can be adduced, let us take the incident related by Mr. Edward. He saw two birds vainly trying to turn over a large fish on the sands, to get the vermin beneath. After many futile attempts, extending over half an hour or more, and after attracting a third bird who helped them to no purpose, they stood together, and apparently by their noise were engaged in some mysterious process of conversation and reasoning. They again set to work and dug a large hole in the sands from one side of the fish, even to undermining a certain distance, and then with evident expressions of triumph, rolled it over with ease and commenced the feast they had worked for. That fish measured $3\frac{1}{2}$ feet, being a fine cod, and those birds undoubtedly used their reason to elaborate a scheme to accomplish their object. Without running off into Darwinian theories, I would remind Dr. Keegan, as he lays so much stress on the capacity of the brain, that one of our great physiologists tells us "that every chief fissure and fold of the brain of man has its analogy in that of the ourang," whilst Huxley adds "whilst in those things in which the brains of men and apes do differ, there is also a great difference amongst various men." It is true structure is not all—the machinery may be perfect in every detail, yet if it lack the motive power of what avail is it? Still is it not reasonable to suppose that structure being so similar, God intended the ape to use her brain like man's but in a less degree? The chief obstacle to belief in reason in animals lies in the fear of what the admission may lead to, but surely we need not grudge these poor brutes the possession of a feeble development of reason, when man, and man alone, can thank his Creator for giving him a hope of a future which no animal is destined to enjoy.

Birds and the Hard Weather.—The various notes which have appeared on this subject have been read with much interest by us, especially Mr. Bingham's paper, Science-Gossip, page 70. We also, during the long severe winter, just experienced, have diligently fed twice a day our poor feathered friends; very delightful and pleasant it has been to watch the instinctive knowledge, almost amounting to reason, which appeared to bring them at the exact time their food was regularly put out for them. At the first appearance of the frost and snow, about the end of November, we had not only large numbers of sparrows, robins, and tom-tits, but also a good gathering of blackbirds, male chaffinches, and thrushes; eagerly they assembled on the trees to watch for the first crumbs thrown out, their bright, intelligent eyes quickly detecting the breakfast or dinner on the table. Soon, however, the cold of our northern climate was too severe for the thrushes, and about the middle of December they quite left us, but not before two of their number came to an untimely end: one was caught by the cat, its poor wings being too much frozen to fly away from pussy's reach, the second came into the house, as if to ask for help, but before it could be given it fell down dead. Both were evidently not only frozen, but starved to death. As the cold weather continued, we had, about Christmas, the magpies and rooks, in addition to our other birds. The rooks gradually increased in numbers each day, until on one occasion thirty-one were counted on the trees. Their favourite food appeared to be meat; we threw out some fowls' bones one morning, which seemed to be a great treat to them, for they carried away both the flesh and the bones. In the early part of December we had the starlings, but they soon left us, and have only recently (March 2) returned to us. Also on that day four thrushes again appeared, and regaled us with their sweet, thrilling song. It may not be without interest here to remark that we believe the thrushes do not leave England, but the late severe winter has driven them south. A lady friend living in Buckingham, who has been feeding the birds this winter, told us in a letter that she had twelve thrushes each morning. The blackbirds have remained pretty much with us, though they have been, with other small birds, greatly thinned by our neighbours, during the frost and snow, amusing themselves by shooting our valued feathered friends. And most cruel it appears, so to take advantage of their half-starved state, especially as they have come to us in confiding trust to have their unspoken wants relieved! The fieldfares have been numerous, and the heron has been seen flying over this neighbourhood, rather an unusual circumstance. We also were visited by a rat, which not only partook of the food thrown out for the birds, but burrowed close to the window. We were not quite so kind to him as was Mr. Bingham to his rat, for we set a trap, which, though it was not strong enough to secure him, had the effect of driving the poor fellow to seek a home elsewhere.—*Elizabeth Edwards, Stoke, Stafford.*

Cuckoo's Visits.—It may be interesting to know that during the last summer and for the preceding four or five years, I have noticed a cuckoo frequenting this locality (a suburb of London). I have seen it repeatedly upon the trees overhanging and adjoining my small garden, and upon one occasion it remained perched upon a rail in front of my fowl-house for more than half an hour. I cannot say positively that it was the same bird, but it was (or they were) always small, and as cuckoos vary considerably in size (I have shot many) I have no doubt that such was the case.—*J. I., Erixton.*

The Cuckoo's Eggs.—Having had a good deal of experience with regard to cuckoos and their eggs, perhaps the following remarks, the result of my own observations, may not be without interest to "Junior" and others of your correspondents. My experience agrees with that of the writer in the April number, p. 95, for out of all the numbers I have discovered I never took one from a nest built on the ground. With one exception, to be mentioned presently, I found them all in the nests of the hedge-sparrow and wagtail. Those from the latter were generally similar to the eggs in the nest (but larger of course), and had streaks, and not spots. The exception to which I have referred just above was one taken from a common wren's nest, which was built in furze placed in hurdles in order to make jumps for horses. This egg was smaller than any other cuckoo's which I have seen. There were six wren's eggs in the nests with it. I have never found more than one egg in the same nest. —*F. Anderson, Chichester.*

Black Bullfinches.—Hemp seed will, I know from experience, darken the plumage of most birds, and bullfinches are especially liable to change colour if much of this seed is given to them, although they are particularly fond of it. I had a bullfinch that turned black in the same way as "St. Austell" describes his to have done, but my bird did not lose his vocal powers, and was in perfect health. I saw a black bullfinch not long since in a cottage window, and went in to ask the mistress, who keeps a village shop, if she gave the bird hemp seed, but she said it had grown up black. She had taken it, I discovered, from the nest, and its plumage had from the first been black.—*Mrs. Alfred Watney.*

Tree Sparrow. — In looking over some odd numbers of an old periodical, I saw a short account of this bird. Amongst other particulars, it stated that it had only been found breeding in seven English counties; and as I have frequently found it nesting here (North Yorkshire), I thought the following notes concerning it might not prove uninteresting to the ornithological readers of Science-Gossip. It most usually constructs its nest in the hollow parts of trees, especially where a hole has been formed by the breaking away of a branch. But this is not invariably the case, for in the year 1876 I found a perfect colony of them nesting in the roof of an implement shed attached to a farm. There had been a heap of thorns laid upon a few cross beams, and upon these the usual thatch of straw had been laid. It was in the thorns that the nests were found. There were over a dozen of them, besides several of those of the house sparrow; and all of them contained either eggs or young. On revisiting the place again last year, I only found one or two nests, all the "good holes" being apparently occupied by the house sparrow, to the exclusion of its smaller relative. —*J. A. Wheldon, North Allerton.*

Curious Sites for Birds' Nests.—Your correspondent on the above subject does not mention the prolific site that an old magpie's nest affords, and the number of birds that make use of it after the original builders have done with it; from my own experience as a "birds'-nester," I have taken the eggs of kestrel, sparrow, hawk, brown owl, blackbird, thrush, starling, stock-dove, pied wagtail, redstark, nuthatch, creeper, great tit, blue tit, and once, built in the cross sticks of the dome, the nest of the long-tailed tit; when magpies were more plentiful than they are here now, their old nests were an almost certain find for stock doves, and many a pair of eggs and young have I taken from them.—*G. T.*

PLATES OF BIRDS' EGGS.—Could any reader of SCIENCE-GOSSIP inform me whether there are any tolerably cheap, but good coloured plates of British birds and eggs, or eggs separately, and if so where obtainable?—*T. J. W. Oakley, Stoney Cross, Bournemouth.*

A STRANGE PLACE FOR MARSH PLANTS.—Had not Mr. A. Craig-Christie's remarks (p. 16) appeared to require some comment, I would not have reverted to this subject. But as he says all the plants in the list "are to be found all along the coast from Bowness to North Berwick (in damp and marshy places)," and as this includes Leith and its neighbourhood, any one who has not an opportunity of examining the place, will naturally infer that they have sprung up from the seeds of plants in the immediate vicinity, and that, far from being unusual, their speedy appearance is only a natural sequence of the exclusion of the salt water. But this is not the case. The Leith and Portobello branch of the North British Railway runs close to the shore for about a mile east of the town, and is bounded on the north by a sloping sea-wall, that was formerly washed by every tide, and on the south by the turnpike road between Leith and Portobello; this again being bounded by dwelling-houses, gardens, and fields. So it will be seen that hardly any vegetation, other than marine, could or did grow there. Again, Mr. Christie says:—"Most of them used to grow at the Figgat Whins, between Leith and Portobello." It may be so; but both they and the Figgat Whins have long disappeared, and of fifteen species observed, only three, namely, *Ranunculus sceleratus*, *Veronica beccabunga*, and *Catabrosa aquatica* are now found between the two towns, a distance of three miles; so far as I can see, after a careful examination of the coast; while between Leith and Granton, about an equal distance in the opposite direction, none of them are found at all. As my previous note was forwarded in July, a few additional species were subsequently observed before their growth was finally stopped by autumnal frost. And several littoral species, not recently found near Leith, also made their appearance. Among these I may mention *Aster tripolium*, *Salicornia herbacea*, *Triglochin maritimum*, *Juncus Gerardi*, and *Scirpus maritimus*. All these were probably at one time common here, till their gradual extinction from alterations made on the coast, through the exigencies of trade and commerce. In conclusion, I have recently received information that appears to afford a satisfactory explanation of the matter. A native of Leith tells me that the overflow water from Lochend Loch at one time entered the Firth at the place where the plants now grow, but that several years ago it was drained away in another direction, and now runs into the Firth much farther eastward.—*D. Douglas.*

INTERESTING PLANTS IN THE ROYAL GARDENS, KEW.—On the west-side of the Economic house is *Schinus Molle*, the Peruvian Mastic, introduced into this country about 1597, and included in the natural order Terebinthaceæ, tribe Anacardieæ, of Hooker's "Genera Plantarum." It is a small diœcious shrub with unequally pinnate leaves, and white flowers in panicles. The cells in the leaves contain a great quantity of volatile oil or resinous matter, which is violently expelled if the leaves be placed in water, the recoil causing a motion that appears to be spontaneous. In Italy, where this plant succeeds well in the open air, a shower of rain renders the air fragrant with the discharged oil. The young leaves of several species of *Rhus* exhibit the same phenomena when immersed in water. The Peruvians employ the roots as an astringent medicine, and in Chili a kind of wine is prepared from the fruits. *Schinus* is the Greek term for *Pistacia Lentiscus*, and was applied to the present plant from the similarity in their medicinal properties. The specific name *Molle* is not the neuter form of *mollis*, as might be supposed, but an adaptation of the native term *Mulli*. On the same side is the notable manchineel (*Hippomane Mancinella*) found on the sandy shores of tropical South America and some islands in the West Indies—a Euphorbiaceous tree, with ovate-elliptical shining leaves, and inconspicuous unisexual flowers. The milk-white juice of this plant has a volatile poisonous principle; which, however, is not sufficiently virulent to render credible the innumerable marvels related concerning its effects. The manchineel is said to rival the upas-tree of Java in the number of wonderful tales with which it is connected. We have reliable evidence of one property in the works of Dr. Leeman, who states that he and some sailors were affected by temporary blindness through getting some of the juice in their eyes, when on shore at Veraguas. The statement that persons have died through sleeping under the tree, was doubted by Jacquin, who judged from his own experience; but Ad. de Jussieu thought, very reasonably, that its effects might vary on differently constituted persons. The fruit is fleshy, and closely resembles an apple in shape and colour, but as it contains the same noxious principle as other parts of the plant, we can readily imagine what an extremely disagreeable surprise would greet the unfortunate individual who might attempt to eat it. The name *Hippomane*, from *hippos* and *mania*, was given by the Greeks to a plant that grew in Arcadia, which had the reputation of rendering horses furious. At the other side of the house we have *Physostigma venenosum*, the "ordeal bean" of Old Calabar; a leguminous plant included in the Phaseoleæ. It has a climbing stem with alternate, pinnately trifoliate, stipulate leaves; the leaflets acuminate, and base of the common petiole swollen; the purplish flowers are borne on pendulous axillary racemes. The style is very long, bearded, and tapering, to near the apex, where it is broadly dilated into a triangular hood above the stigma; from this peculiarity the generic name and character are derived. Although valuable nutritive qualities characterise leguminous plants generally, yet a deleterious principle occurs in several species, and in none is it more strongly marked than in Physostigma, which is certainly the most poisonous of this vast order. The active properties are concentrated in the seeds, and are found to be owing to the presence of the alkaloids eserine and physostigmine. The seeds are used by the natives of west tropical Africa as an ordeal, similarly to the Tanghin described in the last paper. The extract and alkaloids have a peculiar effect upon the eye, causing contraction of the pupil; hence, of late years they have become valuable ophthalmic medicines.—*Lewis Castle, West Kensington Park.*

"STOCK-FROST," &c.—What are the phenomena which go, in the Norfolk district at least, by the name of "stock-frost," "stock-ice?" I have heard men whose veracity is unimpeachable, and not unintelligent men either, assert that in certain frosts the bottoms of streams and "broads" will freeze, and at the giving of the frost, a substance something like ice-cream in appearance will come to the surface, this substance having imbedded in it the weeds that grew near the bottom of the water, and often the stones and brickbats that might be resting on the mud. I don't understand the phenomena, but if those who know would kindly insert an answer to my query, they would much oblige—*Ignoramus.*

"HONEY-STALKS."—It is generally supposed that the writer of "Titus Andronicus" referred to clover flowers in the lines quoted by C. Foran. The long tubes of the corolla in the flowers of *Trifolium pratense* abound in honey. It is, I believe, an error to suppose that the clover flower produces rot in sheep, though the author of "Titus Andronicus" leads us to suppose so, as the lines concerning the "honey-stalks" seem to show :

> "With words more sweet, and yet more dangerous,
> Than baits to fish, or honey-stalks to sheep ;
> When as the one is wounded with the bait,
> The other rotted with delicious feed."

I may here remark that the play "Titus Andronicus" is very generally believed not to have been written by Shakespeare at all. I think I am right in asserting that in modern editions of Shakespeare this play is omitted as spurious.—*Charles F. W. T. Williams, Bath.*

"HONEY-STALKS."—(No. 173, p. 118) : the flowers of white clover (*Trifolium repens*, L.). It is an interesting fact that this is still the local name of the plant in Shakespeare's native country. —*Robert Holland.*

"HONEY-STALKS."—Nares in his Glossary quoting the passage from Shakespeare's "Titus Andronicus" referred to by your correspondent, C. Foran, says "honey-stalks" are clover flowers, which contain a sweet juice, and that it is common for cattle to overcharge themselves with clover and die. I may add that country children often suck the flowers for their sweet juice, which they call honey.—*W. Thompson, Sedbergh.*

"HONEY-STALKS."—I find under this head in Nares' "Glossary of Shakespeare," "Clover flowers, which contain a sweet juice ; it is common for cattle to overcharge themselves with clover and die." I hope that this explanation will satisfy your correspondent.—*F. A. Bather.*

COSSUS AT SUGAR.—In answer to the query in May number of SCIENCE-GOSSIP, I may say that in July 1876 I saw a specimen of the above insect on sugar at Willans, near Lea Bridge, Hackney, but it flew off the tree immediately the light came upon it. The same incident occurred last year, but I was unsuccessful in bottling the insect, which was a very shabby specimen. However, the next night he paid us another visit, and we captured him, but owing to bad condition gave him his freedom. I also met a collector who had a freshly-emerged specimen which he assured me he took at sugar, at the same locality. —*Arthur J. Rose.*

COSSUS AT SUGAR.—Your correspondent, W. H. Newberry, inquires for instances of *Cossus ligniperda* coming to sugar. A few summers ago I took a specimen near Semley, Wilts, in an oak-tree which I had painted with a mixture of treacle and beer, it crawled up from the ground to the first drop down the base of trunk ; this, however, is the only occasion I have noticed the species attracted by sweet fluid.—*H. P. Stock.*

ABNORMAL CHARACTER OF THE SEASON.—It may be worth putting on record that this year the palm-tree, and the blackthorn, only began to blossom in this neighbourhood on May 2. According to the Rev. L. Jenyns, the flowering of the former tree ranges from March 17 to April 19, as that of the blackthorn from March 15 to April 20. The return of birds of passage has been little affected. Swallows were first seen here on April 20, and the cuckoo was first heard on April 25, dates by no means exceptionally late. This fact disproves the old notion that migratory birds have a mysterious foreknowledge of the state of the weather in the country to which they are going, and time their movements accordingly.—*J. W. Slater, Aylesbury.*

SLEEP OF ANTS.—I should be obliged if any of your correspondents could give me the following information. Mr. Emerson in chapter iv. (entitled "Language") of his essay on "Nature" says : "The instincts of the ant are very unimportant, considered as the ant's, but a moment a ray of relation is seen to extend from it to man, and the little drudge is seen to be a monitor, a 'little body with a mighty heart,' then all its habits, even that said to be recently observed that it never sleeps, become sublime." What I wish to know is whether there is any evidence to prove that the ant never sleeps ? I should be much obliged if any correspondent can give me this information.—*S. T.*

THE THERMAL SOURCES OF CARLSBAD.—I am very glad to see in the SCIENCE-GOSSIP recently, that a local cause for hot water has been discovered at Carlsbad. Will, you allow me to offer you a quotation from my "Interior of the Earth," 1870, "Hot Springs" p. 51 ? "It is sufficiently proved by the analysis of the waters, that the materials carried with them are conducive to heat. As then these trickling subterraneous waters work downwards, they come to the materials which had long ago been subjected to the natural heating causes ; these materials gathered over, and upon the faces of the harder strata, offer themselves to the perpetual erosion of every trickle, so that the alluvial valley is kept perpetually supplied with the bases of the metallic alkalies, with water to create the heat, and with the acids to modify that heat." The cause of heat in all hot springs is local It has suited science to assign the cause to a hot interior, founded on the nebular hypothesis of Laplace, but this is not proved, while the local cause for hot springs is proved.—*H. P. Malet, Florence.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

E. J. OCKENDEN.—See chapter in "Collecting and Preserving Natural History Specimens" (London : Hardwicke & Bogue, price 3*s.* 6*d.*) It is written by Professor Ralph Tate, and gives you full instructions for removing mollusca from their shells. Gwyn Jeffrey's "British Conchology," published by Van Voorst, is the best work we have on this subject.

A. SEINAD (Colchester).—Get Taylor's "Aquarium : its history, principles, and management," price 6*s.* London : Hardwicke & Bogue ; where you will find full instructions as to the details you enquire about.

L. HAWKINS.—We have forwarded your specimens to be named, but you could easily identify and name them for yourself, by getting Cooke's "Microscopic Fungi," price 6*s.*, from Hardwicke & Bogue, 192 Piccadilly, W.

J. R. CORDER.—The common cray-fish (*Astacus fluviatilis*) can be kept in aquaria. Its food consists of aquatic mollusca, insect larvæ, &c., and the cray-fish would even be useful in a large aquarium, in consuming and removing dead garbage. See an account of a domesticated cray-fish in Bell's "British Stalk-eyed Crustacea." The smooth newt (*Lissotriton punctatus*) is soonest adapted to an aquarium. Mr. King, Sea Horse House, Portland Road, London, could supply you with material and objects for aquaria.

E. VILES.—The "slimy substance" on the gravel paths was no doubt the *Nostoc commune.*

M. W. T. (Cardiff).—Get "Notes on Collecting and Preserving Natural History Specimens," price 3*s.* 6*d.* published by Hardwicke & Bogue, 192 Piccadilly, London, and study chapter on "Botanical Specimens," by James Britten, F.L.S.

G. C. D.—You do not say what kind of objects you wish to mount. Canada balsam can be used in India, but requires hardening by heat before putting on the cover glass.

EDWARD WARD.—Your fresh-water algæ are—1. *Zygnema rivulare*, Hassall; 2. *Zygnema* (? *sp.*); 3. *Z. nitidum*; 4. *Vesiculifera Candollii*, Hassall.

J. B.—Your mounted specimens are,—1. *Lyngbia (? sp.)*; 2. *Rivularia granulifera*; 3. *Rivularia.*

F. S. ST. A.—If our correspondent will send us isolated specimens of the algæ she wishes to have named, we will endeavour to get it done, but we cannot ask those gentlemen to whom we are indebted for the identification of specimens, to search over a quantity of crude material, in order to find some particular form, and to which no clue has been given.

J. SEVERS.—Our "Exchange column" is open gratuitously to subscribers of SCIENCE-GOSSIP for their mutual advantage, but we limit the length of the exchanges to about three lines of letter-press.

J. S. DICKIN.—Pritchard's "History of Infusoria" is an old and antiquated book, but the only one in our language before the public. It is rare, and can only be obtained through a secondhand bookseller. Mr. Saville Kent is, we believe, preparing a revised manual of "British Infusoria," a work long wanted. Slack's "Pond Life," and Gosse's "Evening's at the Microscope," are both good books for a young amateur.

W. ROBERTS.—Your specimens of weevil are *Otiorhynchus picipes*. *O. sulcatus* is a distinct species, easily distinguished from the former. Both are destructive foes to gardeners, although the larvæ of the latter have a peculiar predilection for potted plants.

BOTANICAL EXCHANGE CLUB.—Rules of membership, &c., may be obtained by application to 192 Piccadilly, W. It is time that intending workers should send in their names, addresses, and subscriptions, with a view to work this summer.

WILLIAM BENNETT (Clehonger).—Your bat is a remarkable earless specimen of the common flitter-mouse *(Vespertilio pipistrellus)*.

EXCHANGES.

A SPECIMEN of the rare shining moss (*Schistostega pennata*), containing many diatoms, sent for really well-mounted slide.—T. Watson, Bank Parade, Burnley.

STEPHEN'S "British Insects," with coloured illustrations. I have the first four volumes of part i. (i.e. Mandibulata) and the first three volumes of part ii. (i.e. Haustellata) of the above work. Want remainder. Apply to George T. Baker, Hagley Road, Birmingham.

MICROSCOPE (Baker) in case with condenser, polariscope, &c. complete. For £15 or smaller instrument and cash. Also "Beale on the Microscope."—Rev. C. L. Williams, Aston, Birmingham.

AUTHENTICATED British, European, Asiatic, Indian, American, African, Labrador species bird's eggs. Lists forwarded. Exchange offers requested. Foreign correspondence specially wished for.—John William, 11 Priory Road, Sheffield.

FINE slides of the rare *Sphæroploa annulina*, showing fructification, in exchange for other authentically named freshwater algæ, or first class material, diatomaceous preferred.—J. Tempère, 249 Moss Lane East, Manchester.

WANTED, fossils, in exchange for sponges and fossils from the white and red chalk of Yorkshire; also recent shells, in exchange for British land, fresh-water, and marine species. Send lists to Rev. George Bailey, Seaham Harbour.

FOR unmounted palates of *L. litorea*, and *B. undatum*; send unmounted objects to J. M., 12 Porchester Street, near Clifford Street, Birmingham.

WELL-MOUNTED slides of *Aulacodiscus littoris, Aulac. margaritaceus, Heliopelta mollis, Trinacria regina*, several species of Hemiantus and Isthmia, and a large number of diatomaceous deposits from all countries for slides or gatherings of rare diatomaceæ.—Otto A. Witt, 2 Gunnersbury Terrace, Turnham Green, London.

GOOD slides offered in return for insects, living or freshly killed, in spirit. More especially the less common Diptera, gadflies, sawflies, mole crickets, and other orthoptera and neuroptera.—G. N. W., 10 Edinburgh Place, Weston-super-Mare.

WELL-MOUNTED slides of anchor, and plates of *Synapta gallicrena*, in exchange for good unmounted material.—W. E. C., Mr. Greasley, White Cottage, Gregory Street, Old Lenton, Nottingham.

NUMBERS of "Astronomical Register," "Microscopical Journal," "Nature," and others, to exchange for British bird's eggs.—George W. Coultas, High Street, Bridlington, Yorkshire.

AM breaking up my noted collection of exquisite and rare exotic butterflies and moths. Also British coleoptera, 8000 specimens, 4000 species, mounted on cardboard without pins. Also bird's eggs. Full particulars sent. Wanted in exchange, European eggs. No post cards.—Henry Sissons, Brincliffe, Sheffield.

WANTED, unmounted material of all kinds, in exchange for microscopic or lantern slides, or cash.—Joseph Severs, Airethwaite, Kendal.

IN exchange for mounted sections of "Golden Osier" and holly-stems, double-stained, send good slides to A. Alletsee, 11 Foley Street, London, W.

"THE MICROSCOPE," by Hon. Mrs. Ward, new cloth gilt, for Suffolk on "Microscopical Manipulation," or Gosse's "Evenings with the Microscope," or Martin's "Manual of Microscopic Mounting," or Cook's "Rust, Smut, Mildew, and Mould."—A. C. King, South Parade, Ledbury.

OFFERS in exchange (either in foreign land, or foreign marine shells, the former most acceptable) for any of the following British land and freshwater shells, which I have duplicate specimens of at present—namely, *S. oblonga, L. involuta, L. Burnetti, P. ringens, V. pusilla, V. substriata, V. alpestris, V. minutissima, V. angustior, V. Moulinsiana.*—W. Sutton, High Claremont, Newcastle-on-Tyne.

EXOTIC insects of every description from India, Peru, China, America, Java, Africa, Ceylon, &c., exchange arranged by letter. Foreign correspondence specially requested. Selections forwarded on approval, before exchanging.—Sissens, Sharrow, Sheffield.

LIVING water newt *(Lissotriton palmipes)* in exchange for living polyzoa, &c.—J. B., 36 Windsor Terrace, Glasgow.

WANTED, in exchange for fossils, seaweeds, and other natural objects, any old MSS. deeds, books, prints, &c., relating to Kent, Thanet, or Margate.—F. Stanley, Margate.

PATHOLOGICAL crystals, cystin, leucin, tyrosin, &c., in exchange for good mounted or unmounted objects.—J. W., 10 Evering Villas, Clapton, E.

SMALL packet of diatomaceous earth (Stoneyford, Ireland) sent upon receipt of stamped envelope; any object of interest will be thankfully accepted. I have some very fine selected slides of diatoms, some arranged in pattern, that I will exchange for fragments of *Hyalonema mirabilis*, or other good spicula bearing sponges.—W. White, 18 Convent Street, Nottingham.

OFFERED Hooker and Baker's "Synopsis Filicum," 2nd ed., coloured plates. Wanted, Sach's "Text Book of Botany."—Jephthah Makin, Pendlebury, near Manchester.

WANTED to exchange for rare plants, the *Gagea lutea*, and *Chrysosplenium alternifolium*.—George Hastwell, Darlington.

CORAL sections, British and foreign shells, fossils, minerals, and polished sections of madrepores; will take fossils, rough corals, and foreign shells in exchange.—A. J. R. Sclater, Teignmouth.

NEWT'S eggs (living) in exchange for living polyzoa, melicerta, and similar objects. Send to J. B., 36 Windsor Terrace, Glasgow.

BOOKS, ETC., RECEIVED.

"Evolution, Old and New." By the author of "Erewhon." London: Hardwicke & Bogue.

"Electric Lighting, and its Practical Application." By J. W. Shoolbred, B.A. London: Hardwicke & Bogue.

"Organic Chemistry." By Hugh Clements. London: Blackie & Son.

Noad's "Student's Text Book of Electricity." Revised by W. H. Preece. London: Crosby, Lockwood & Co.

"Proceedings of the Literary and Philosophical Society of Liverpool," vol. xxxii., 1877–78.

"Entomological Papers." By C. V. Riley.

"The Silkworm:" being a brief manual of instructions for the production of silk. Washington: Government Printing Office.

"Midland Naturalist." May.

"Land and Water." May.

"Ben Brierley's Journal." May.

"Journal of Applied Science." May.

"Animal World." May.

"American Quarterly Microscopical Journal." April.

"American Naturalist." April.

"American Journal of Microscopy." April.

"Characeæ Americanæ." By Timothy F. Allen, LL.D. Part I.

"Feuille des Jeunes Naturalistes." March.

"Bulletin de la Société Belge de Microscopie." February.

"Marine Engineering News." May.

&c. &c. &c.

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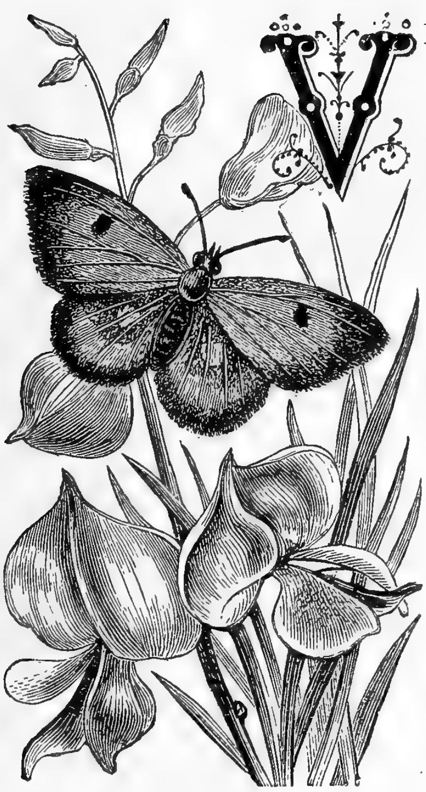
HOLIDAY RAMBLES.

GLEN CALLATER.

By G. C. Druce, F.L.S.



VERY different was the scenery and atmosphere of Deeside from that of Jersey, but the same attractive spell of botanical rarities hung round each, although the flora was as different as the atmosphere and scenery. Here, instead of headlands shining like opals from the profusion of *Sedum anglicum*, we had hills of dusky brown, in places flushing into amethystine tints from the half opened heather, or darkened into sombre olive-green where the pines of Mar and Invercauld grew in rich luxuriance. But the point of most attraction, as we lingered about the gardens of the Fife Arms, or strayed by the Cluny side, was the road leading to Glen Callater, although such mighty rivals as Ben na Bourd, Ben A'an and Ben McDhu, all celebrated for their rarities, were around. So it was towards Glen Callater we first started, following for a time the river Cluny, gathering close to the hotel *Hieracium prenanthoides*—and admiring the little stream as it fell in tiny rapids down to the Dee, but after proceeding some couple of miles, the glimpse of snow on McDhu, now appearing over Braemar, gave new object for our admiration, till this gave place to the pleasure of seeing *Pyrola rotundifolia* and *Listera cordata* growing within a few feet of each other. The common plant of this portion of our walk was *Alchemilla alpina; Empetrum nigrum* later on, however, disputed its claim. Leaving the Cluny for its tributary, the Callater, after some little time we noticed right ahead precipitous cliffs, down one of which was pouring a tiny stream, the far-famed "Break Neck waterfall" of Glen Callater, where some elderly botanist got into such a dangerous place that he dared not go down and could not go back, and was thus imprisoned for more than a day. The *Hieracium vulgatum* was common by the steep sides of the stream till shortly before reaching the loch; on more level ground, where the stream only slowly crept, it became bordered with bog plants, such as Drosera, Pinguicula, while in some of the more stagnant pools *Chara syncarpa* occurred, the quicker running stream yielding *Chara pulchella.*

The lake itself contained *Isoetes echinospora* and *Lobelia Dortmanna.* Here, six miles from Braemar, we commenced the ascent of Loch na Gar, gathering *Polygonum viviparum* and *Carex binervis,* and then were brought to a standstill by the abundance of *Trientalis europæa*, dwarfed to an inch or two in height, but with lovely large flowers. The ascent of the mountain is not particularly interesting, the best views being the corrie of Loch Kander and the waterfall, but several good plants were picked, among them being *Hieracium cæsium* and *chrysanthum*, *Caltha minor*, *Sibbaldia procumbens*, and *Saxifraga aizoides* and *stellaris*, the two latter very common. At still higher elevation *Luzula spicata*, *Carex rigida*, and *Juncus trifidus* occurred, a great abundance growing among the stony débris, and then appeared the tiny *Salix herbacea* with its bright chestnut-red fruit, which with the three former continued nearly to the summit, from whence a splendid view was obtained over Deeside to Balmoral and Ballater, with the Scotch Alps Ben McDhu, Ben A'an, Cairntone, rather uninteresting in outline, being rounded and dumpy in appearance, and wanting the sharp peaks and fantastic outlines of Arran or Snowdonia; but still very beautiful were the snow patches appearing now a blue grey as some passing cloud obscured the sun and now shining with dazzling brilliancy; down below us was Loch Muick, while over by Glen Callater could be discerned the

black Loch Kander with its precipitous corries, the rocks at the head of Glen Callater, and above these appeared the hill forming the watershed of the Clova mountains. Descending to the snow corrie, where in the water running from the snow we got some saxifrages, we soon came to *Azalea procumbens* and *Epilobium alpinum*, and coming down by some roughish descent the ground near Loch Callater was covered with *Arbutus Uva-ursi.*

Another day was spent in walking from Braemar to Loch Callater, and following the western side of the lake, near the head of which we came upon *Veronica beccabunga*, dwarfed to a couple of inches, and with bright blue flowers contrasting beautifully with *Saxifraga aizoides*, with which it occurred.

On the moorland leading up to Loch Kander, *Carex pauciflorus* and *Rubus Chamæmorus*, the latter in flower, were gathered; by the stream issuing from the loch *Salix arenaria* and *Lapponum* occur, and in the lake itself grew *Callitriche hamulata*. The corries round the lake were rich with rarities, *Polypodium alpestre* being especially fine. *Rhodiola rosea*, *Saxifraga hypnoides*, with the varieties *gemmipara* and *sponhemica*, *Epilobium anagallidifolium*, *Alsine verna*, *Polygala vulgaris* approaching *grandiflora*, *Juncus trifidus*, *triglumis*, *Carex pulicaris*, *pilulifera*, and strange dwarfed specimens of *Carex flava*, and some fine *Asplenium viride*, were soon gathered. At some elevation on the precipitous rocks were gathered *Salix reticulata*, *lanata*, and *herbacea*, *Carex capillaris*, and abundance of *Cochlearia alpina*, *Saussurea alpina*, not quite in flower, and *Hieracium pallidum*, *chrysanthum*, *nigrescens*, and *cæsium*. This dark lake Kander, like so many of our British mountain lakes, is situated on the east side of the mountain, and it is probable that their position may be owing to glacial action, the great amount of snow and ice remaining on the colder side. Lakes in this position are to be seen on Ben Nevis, Cairngorm, Loch na Gar, and in many of the Welsh mountains. In the Lake District the difference between the south-western and north-eastern sides of the mountains is very marked, and High Street, Helvellyn, Scawfell have also these mountain tarns on the eastern side.

To return, however, to the cliffs about Loch Kander, where some good scrambling was enjoyed in getting on to the rocks about the Break Neck waterfall, where magnificent *Juncus triglumis* and *Carex atrata* occurred. Then came a grassy place of a less steep inclination, where *Aspidium lonchitis* grew almost by hundreds; here too were found *Leontodon pratense*, *Carex alpicola* and *speirostachya*. By the waterfall grew *Veronica alpina*, not in flower but with a bluish purple about the capsule; the variety *montana* of *Alchemilla vulgaris*; the cudweeds *G. supinum* in both its states *pusillum* and *fuscum*; a form of *Carex binervis*, which at first looked like *frigida*, and *Salix nigricans*, *phylicifolia*, and *pseudo-glauca*; *Hieracium anglicum*, *Vaccinium uliginosum*, *Aira montana*. *Silene acaulis* and *Saxifraga oppositifolia* both occurred in flower, although very sparingly. At the boggy head of the lake *Carex vesicaria*, *Potamogeton polygonifolius*, and other common plants occurred, but after such a feast of rarities our botanical ardour required stronger stimulus than these to linger on our homeward walk.

THE HYPOTHETICAL PLANET.

By J. J. Plummer, M.A., F.R.A.S.

THERE are few pages in the history of astronomy that will read more strangely in the future than the belief which has been entertained so firmly during the last twenty years in the existence of a planet interior to Mercury, and which is generally known by the name of "Vulcan." No doubt much of the tenacity that has been shown in this matter is attributable to the respect due to the genius of the late M. Leverrier, who had a profound belief in the reality of its existence, and than whom there was none other more capable of estimating the value of the evidence in its favour. He subjected, one after another, the motions of all the major planets to the test of the most refined analysis, and had shown in every case how accurately the law of gravitation accounted for all the minor disturbances (technically called perturbations) which the several planets produce upon each other by their mutual attractions. One, and one only, appeared to defy his treatment and the Newtonian law alike, and this, the planet Mercury, the smallest of the larger planets, and the nearest to the sun. The direction of its elliptical orbit is certainly shifting slowly, and the attractions of the neighbouring planets were by him deemed insufficient to account for the fact. No one had better reason to remember than Leverrier, how similar outstanding perturbations had been reduced to order by the discovery of the planet Neptune at the other extremity of the solar system, and it is, therefore, not surprising to find him confident that a like result would be achieved in this case. Indeed, so far as the theoretical side of the question is concerned, the case appears to be completely in favour of an undiscovered planet interior to Mercury, and the full weight of this evidence was doubtless not only felt, but exaggerated in the mind of the great French astronomer.

The difficulty of verifying practically these conclusions by the actual discovery of a planet is very considerable, owing chiefly to the close proximity to the sun which such an object would constantly maintain, and the only hope of bringing the telescope to bear upon the actual body would necessarily be during an eclipse of the sun, or on the occasions when the planet might project itself on the solar disc. There are not wanting records, more or less definite and precise, of the appearance of minute spots upon the solar orb unlike the well-known sunspots, but unluckily no practised astronomer has yet succeeded in securing a

glimpse of these strange objects, so very like planets *in transitu.* A number of them, some five or six, group themselves round a particular day in the month of March or October, in such a manner as to render it possible, at least, that they might be transits of the same body, for it is to be remarked that a transit of a planet can only be seen when the object is near one of the nodes of its orbit, that is, when it is crossing the ecliptic, and thus can only have place when the earth is in the same longitude as the node, or twice a year at an interval of six months. But now the difficulties begin to accumulate. If these five or six observations of spots be really transits of a single planet, it should be possible to predict the recurrence of like transits, and Leverrier, believing in the trustworthiness of five of them, did predict a transit of Vulcan for the month of March 1877. The supposed planet, however, failed to put in an appearance, and Leverrier died while the question was still unsettled.

Somewhat later M. Oppolzer has taken up the subject, and using eight observations of spots made at various times during the present century as *bonâ fide* transits of Vulcan, found that these could be reconciled by a second hypothesis differing considerably from Leverrier's, and which could readily be tested, as transits must occur very frequently, and he fixed the 18th March of the present year as one of these crucial occasions. Just as previously, however, astronomers in all parts of the world anxiously scanned the sun upon the day named, and met with the same ill-success. Probably this would have been the last attempt of the kind, and astronomers would have remained content with this negative evidence as proving the non-existence of Vulcan, but the question in the meantime had assumed a new phase.

We have stated that Vulcan should be visible in all probability to the naked eye, and certainly with the aid of small telescopic power during a total eclipse of the sun. Frequently as these phenomena have been observed of late years by the most experienced astronomers, none have glimpsed the doubtful Vulcan, although in justice it must be said that these precious moments have generally been fully occupied by the investigation of a variety of other important questions. As these, however, have gradually neared to a solution, the last total eclipse visible in America in July 1878 was devoted by several able astronomers to this task, and the search for Vulcan was perhaps the most prominent feature of the observation. Two of the observers alone claim to have seen planetary bodies near the sun, though perhaps in consequence of the haste in which their respective positions were noted it has not been found possible to identify and reconcile the remarks of the two discoverers, so that whether there were one or two or three or four Vulcans seen during the eclipse is regarded by some as an open question. One point, however, is conceded, viz., that none of the four can possibly be the theoretical Vulcan of Leverrier, nor the inferred planet of Oppolzer, and we are thus afforded valuable evidence that the cause of the erratic movements of Mercury has not been discovered, and in all probability is not discoverable in the shape of a planet nearer to the sun than it.

It would be useless, however, to deny that much interest attaches to what was actually seen in America last year, and it is with a certain amount of relief that we find the examination of the observations then made has been taken in hand by so eminently able a mathematician as Dr. C. H. F. Peters, and a result evolved that admits of no cavil. He has shown to the satisfaction doubtless of all unprejudiced persons that the discoverers were themselves mistaken, and had fallen into the error of taking conspicuous stars to be minute planetary bodies, and without impugning either their ability or their honesty, the excitement and hurry of the moment are amply sufficient to account for the erroneous announcement which startled the world a few months since. At the very moment when the believers in Vulcan thought they had their hands on the object of their search have their hopes been dashed to the ground; and as if to crush the last lingering remains of life entirely out of this hopeful hypothesis the same astronomer has been able to show incontrovertibly that the most trusted observation of the supposed planet on the solar disk is utterly unreliable. It is seldom that so fatal a stroke has been aimed at a long-cherished scientific fallacy.

But it must not be forgotten that the change of position of the axis of Mercury's orbit is an ascertained fact and needs explanation. We require continually to improve by observation the data upon which our theoretical results are based, and should it be found, as there is already some ground for believing it may be, that the planet Venus is a denser and more powerfully attracting body than it has hitherto had the credit of being, the difficulty will be solved, and the theory of gravitation will stand in as proud a position as it could have done had the conjectures of Leverrier been confirmed by the discovery he so ardently longed for.

ON THE STUDY OF INFLORESCENCE.

By H. W. Syers, B.A. Cantab.

THE consideration of the manner in which flowers are arranged on the axis which bears them is a very interesting and a very important division of botanical study. Not only do we find that flowers, in their position and arrangements, are far from occupying merely haphazard and chance positions, but, on the contrary, in all cases the arrangement follows such simple and definite forms, that systematic botanists have found the inflorescence or antitaxis a most valuable assistance and guide in classification. The study of inflorescence teaches us not only the relative positions of the flowers to each other and to

the axis, but also the order in which they open, and this is called their evolution. We must remember that in all cases a flower-bud is like a leaf-bud; and that the flowers, like the leaves, arise from the axis in one of two ways: that is to say, the buds are either produced in the angle formed by the inclination of a leaf to the stem (axillary), or else they arise from the termination of the axis (terminal). But in the axillary mode of inflorescence the leaf which forms the angle with the axis is called a *bract.* In many cases these bracts are not to be distinguished from leaves, and their structure is similar. Such instances occur in the periwinkle (*Vinca*), pimpernel (*Anagallis*) &c. But in other cases these bracts assume a very different appearance, so that even the most superficial observer would notice the want of resemblance to true leaves. Spathes, glumes, the involucre of Compositæ and scales are all so many modifications of bracts, and it should be borne in mind that all these are but different forms and arrangements of leaves—the leaf being the morphological type on which the whole structure of the flower is founded. It is noticeable, in passing, that the presence or absence of bracts constitutes a valuable classificatory medium. Now, as has been mentioned above, flowers are either axillary or terminal in their relation to the axis. And it is this relation which gives origin to the two great divisions of inflorescence: indefinite and definite. In the former division the axis gives off axillary buds, which expands from below upwards—those situated lowest expanding first, the axis itself being carried on indefinitely. Thus the expansion of the flower is centripetal—centre-seeking. The simplest form of the inflorescence is seen in the currant, fumitory, &c. In this the pedicels (secondary axes) are of equal length, and each has a bractlet at its base. The corymb is simply a slight modification of the raceme—the lower pedicels being longer than the upper ones, and thus forming a more or less flattened surface. It should be noticed that an inflorescence which at first appears to be corymbose, may ultimately become racemose—e.g. in Cruciferæ.

Fig. 119.—Forget-me-not *(Myosotis palustris)*, showing scorpioid inflorescence.

Fig. 120.—Comfrey *(Symphytum officinale)*, showing scorpioid inflorescence.

The umbel is another form of this inflorescence, the primary axis being shortened, and the secondary axes coming off from the same points (radii), so as to be nearly equal in length.

Notice also the bracts forming the involucre and involucel in Umbelliferæ. There is a term to which different meanings have been attached by different writers—the panicle. Perhaps the best definition of a panicle would be an inflorescence in which the secondary axes give rise to tertiary ones which bear the flowers. But it is frequently used to express a totally different kind of inflorescence (the definite), and, like all terms which are ambiguous, has become unsuited to the requirements of true science. The spike is simply a sessile raceme, and the spadix a succulent spike.

We now pass on to the second great division of inflorescences, the determinate or definite. Here the primary axis ends in a solitary bud; and if but a single floral axis is formed the inflorescence is of the simplest possible description. Should there be more than one axis, the others arise from the first in an axillary manner, but lower down and farther away from the central axis. The flowers expand in a centrifugal manner (centre-flying) and later, as regards time, than the flower terminating the primary axis. The best example of a definite inflorescence is the cyme, and can be well studied in the order Caryophyllaceæ. This cymose inflorescence may be either dichotomus or trichotomous. In the former, the primary axis gives rise by axillary buds to two secondary axes, and each of these again to two others. Thus there is a sort of division by pairs; hence the term (δίχα, by twos). In the latter the secondary axes are three in number, and the arrangement is three-divided. It should be noticed that the cymose inflorescence is frequently associated with opposite leaves, though this is not always the case. A very interesting and most curious modification of the cyme is seen in the scorpioidal cyme. This is simply a dichotomous cyme, in which the buds on one side are not developed, thus becoming unilateral. A study of this mode of inflorescence, as seen in the Boraginaceæ (*Myosotis*, &c. (figs. 119 and 120), will be found most interesting and instructive. Should any one feel doubtful as to his correct appreciation of the term cyme, let him at once examine this form of the inflorescence, and his power of interpreting the mode in which the flowers come off will afford a sure test of his accuracy in this respect. The last form of definite inflorescence that we shall notice is the verticillaster. Here a pardonable mistake is easily made by the tyro in botany. For to all appearance the flowers are simply arranged in a circle or *whorl* around the axis. But more prolonged observation shows that this is not the case. In point of fact the inflorescence is cymose—though withal the cymes are nearly sessile—and, of course, the expansion of the flowers is centrifugal. For this mode of inflorescence the common Dead-nettle (*Lamium album*, fig. 121) and other Labiatæ may be studied. And now we must just touch on the subject of mixed inflorescence. In some cases the

Fig. 121.—White Dead-nettle *(Lamium album)*, with cymose inflorescence.

Fig. 122.—Centaury *(Erythræa Centaurea)*, showing trichotomous cymes.

two kinds of inflorescence, definite and indefinite, may be observed on the same plant. For the inflorescence, taken as a whole, may be definite, and the individual inflorescences may be indefinite, and *vice versâ.* An example of this occurs in the genus Senecio, and in other genera of Compositæ. If a head of groundsel be examined it will be noticed that the aggregation of florets forming the capitula or heads, taken together, have a centripetal expansion, the general inflorescence being indefinite. But if the expansion of the individual heads be observed, it will at once become clear that the inflorescence is centrifugal, and therefore definite. Here, then, in the same plant are found two distinct forms of inflorescence, hence the inflorescence is said to be mixed. Another instance may be cited, that of the verticillaster of Labiatæ. As explained above, the partial inflorescence is definite and centrifugal; but the general inflorescence is centripetal. There are many other examples of these mixed inflorescences, all of which are well worthy of careful study. The names of a few genera with mixed inflorescences are subjoined: horse-chestnut (Æsculus), flowering-rush (Butomus), Sparmannia, Veronica, &c.

A review has now been taken of all the chief forms of inflorescence, and to one or other of these nearly all the inflorescences of the British orders may be referred. There are, however, some irregular forms which cannot be classified under any of these heads; but they are comparatively few and unimportant. A noticeable form is that occurring in the butcher's broom (*Ruscus aculeatus*). Here the flowers are borne on those curiously modified stems to which the name of cladodes has been applied. On taking a survey of some of the natural orders, we see in how many a certain marked form of inflorescence obtains. For example: the prevailing form in Cruciferæ is the raceme or corymb; in that interesting order Caryophyllaceæ, or Clovewort order, the cyme is the typical mode of inflorescence, and in no order can the di- and tri-chotomous cyme be studied in greater perfection. In Linaceæ the inflorescence is cymose, and the genus Linum is peculiar in having this mode of inflorescence associated with alternate leaves, not opposite, as is usually the case. It is hardly necessary to refer to the inflorescence of the Umbelliferæ, for it is so characteristic that it is impossible to mistake it. In Rubiaceæ (the Madder family) the flowers are often arranged in sessile or peduncled cymes. The inflorescence of Compositæ has been already explained —as affording an instance of a union of the two great types. The cyme is again seen in great perfection in Gentianeæ—the Gentian order—and the beautiful little flowers and delicate trichotomous cymes of the Centaury (*Erythræa Centaurea*, fig. 122) must be familiar to all. It is not necessary to describe the inflorescence of the Labiatæ, as it has already been referred to. Other orders worthy of notice are Primulaceæ, Lentibulariaceæ (containing the curious genus Utricularia, supposed to be carnivorous) Plantaginaceæ, Urticaceæ, etc. A study of inflorescence in these and kindred orders, is of the highest interest and importance, giving not only enlarged and comprehensive views of the different flower-arrangements obtaining in the different groups, but also training the mind to exact and precise methods of observation and comparison. And the writer has endeavoured, by drawing attention to this subject, to point out to all lovers of nature in general and of flowers in particular, how far preferable it is to start from the very first in a truly scientific and accurate spirit of enquiry. For in this single instance of flower-arrangement, an immense amount of mischief has been wrought to true botany by the ambiguous, loose, and inaccurate use of such terms as raceme, thyrsus, panicle, &c., so that since the time of MM. Röper and Bravais (to whom the first accurate observations of flower-arrangement are due) an immense vocabulary, totally meaningless and useless, has arisen on the subject of inflorescence. The writer hopes that some readers of SCIENCE-GOSSIP at all events will turn their attention to this most interesting subject, the study of which, in an intelligent and comprehensive manner must be attended with the best results.

THE NEW FOREST.

By E. D. MARQUAND.

[*Continued from p.* 125.]

AND now as to the flora of the New Forest. In richness and variety it yields to no other spot of equal area in the kingdom, though it is possible that a few specially-favoured localities may slightly exceed it in the number of species. Within the limits defined at the outset of this paper, I have found and catalogued very close upon seven hundred and fifty phanerogams; besides these there are several which I know on excellent authority to exist, but have not as yet come upon them—and not to speak of those given in books as occurring, but which have not been traced, we have a total which does not fall far short of eight hundred; that is, one half of the entire British flora as enumerated in the "London Catalogue." This is a goodly number for a district something under fifteen miles square.

Some of the rarer and most interesting species which have come under my observation deserve a passing note, and it will facilitate reference and at the same time be more methodical, to follow the order adopted in the "London Catalogue."

Number 1 first calls for notice: *Clematis Vitalba*, a plant common enough on the chalk, but one would scarcely expect to find it here, yet it flourishes in the hedges of a lane on the coast, a few miles from Lymington. Among the Cruciferæ only two need be mentioned: *Diplotaxis muralis* and *Draba verna*; the latter (usually so abundant) being exceedingly

rare in these parts; I searched for it in vain during three seasons, and at last found it on a wall in the vicinity of Ringwood. *Viola lactea* occurs on many heaths, and I fancy I once found *V. stagnina*, but am not certain. Another generally common plant is here of great rarity: *Malachium aquaticum*. *Claytonia perfoliata* grows in profusion in the sand at Mudeford and its neighbourhood, where in the salt marshes may be seen *Althæa officinalis*, and occasionally in the hedges (but always introduced, of course) Lavatera. The Leguminiferæ include some rare species: no one walking across any of the forest heaths and moorlands in the month of August can fail to notice the trailing golden-blossomed *Ulex nanus*, which in some places attains a height of three feet or more. On the coast we get that very small plant with a very long name, *Trigonella ornithopodioides*, and *Medicago maculata*. *Trifolium glomeratum* I discovered here last summer, and *Vicia orobus*, a northern plant, was pointed out to me; as far as I know it only occurs in one spot, not easily discoverable, but when once seen its delicate pale green fern-like leaves are not to be mistaken. Though it is miles from any habitation I cannot, for various reasons, consider it truly indigenous. *Agrimonia odorata* I discovered two years ago; it is a much larger plant than its congener, and may always be recognised by its lemon-like fragrance. I almost believe now that *Isnardia palustris* is extinct, in this part of the county at least. *Tillæa muscosa* is frequent on sandy heaths.

The Umbelliferæ do not furnish anything very good, as far as my experience goes, except, perhaps, *Œnanthe pimpinelloides*, a rather common plant in this neighbourhood, *Fœniculum*, about Christchurch, and *Crithmum maritimum* on the sea wall. *Rubia peregrina* seems only to occur under the shade of the clematis before alluded to, so both may possibly have been introduced from the Isle of Wight. *Tanacetum vulgare* is rare; *Inula crithmoides* grows here and there all along the sea wall, and *Crepis biennis* I have found on the coast. The delicate little *Wahlenbergia hederacea* grows profusely in some boggy ground not far from Lyndhurst; almost all over the Forest the tiny golden stars of *Cicendia filiformis* peep among the turf; and the splendid large blue corollas of *Gentiana Pneumonanthe* gleam among the heather on a few moist heaths. *Linaria repens* is common in hedges at Marchwood, and near Brockenhurst, and, in a few other places, *Bartsia viscosa*. *Orobanche minor* also grows near here, though sparingly, while *O. major* seems peculiar to Beaulieu.

As every one knows, *Pulmonaria angustifolia* is one of the great botanical features, and is so widely and plentifully distributed throughout the forest that there is not much fear of its eradication. The lovely little *Pinguicula lusitanica* is common enough in the bogs, where may be seen the delicate threadlike branches of *Utricularia minor*, but *U. intermedia*, though abundant where it exists, is rare. In a few bog pools I have met with *Sparganium minimum*, and in one locality only the singular *Actinocarpus damasonium*. Of orchids we have a good number: *Orchis incarnata* I have seen growing with *O. latifolia* and *O. maculata* in the bogs at Holmsley. Since writing my note in SCIENCE-GOSSIP, vol. xiv. p. 138 on *Spiranthes æstivalis*, I have been so fortunate as to discover it in another part of the forest, well established and in great plenty. It is quite unnecessary here to specify the locality. The tiny *Malaxis paludosa* I find pretty widely distributed, though doubtless it frequently escapes observation. The habitat of *Gladiolus illyricus* is in the heart of the Forest, apparently flowering only once in two years—at any rate in some seasons not a single flower is to be seen. *Luzula Forsteri*, a handsome woodrush, grows both near Brockenhurst, and very abundantly in a wood near Beaulieu.

The Cyperaceæ include some very interesting plants: *Rhynchospora fusca* grows in almost all wet bogs, *Scirpus uniglumis* on many heaths, and *Sc. Savii* commonly in roadside ditches. The Carices are well represented: I have found thirty-three species, and know of three or four more. Among the best I have seen are *Carex limosa*, *C. Œderi*, and *C. montana*. The last flowers very early and was almost past when I discovered it last year. It is a rare sedge, and a good addition to the county flora.

Lastly, the grasses. Among the best I know are: *Leerzia oryzoides*, in two or three parts, always on river-banks; *Phalaris canariensis*, apparently wild on the sandy shore at Mudeford; *Gastridium lendigerum*, frequent, mostly near the coast; *Agrostis setacea*, on heaths near Brockenhurst; *Calamagrostis lanceolata*, at Holmsley and Ringwood; *Aira setacea* (*A. uliginosa* "Lon. Cat.") in several of the bogs near Brockenhurst; *Sclerochloa procumbens* near the sea; *Briza minor*, occasional, and nearly always in cultivated fields; *Bromus madritensis*, not far from the shore, and *Triticum acutum* at Mudeford.

Twenty species of ferns are said to occur, but I cannot say whether quite as many are to be had within the district about which I am writing; I know of sixteen only. The stately *Osmunda regalis* is well distributed; I have seen it in half-a-dozen places within a couple of miles of Brockenhurst, sometimes forming large clumps, with fronds three or four feet long, sometimes helping to make the hedge of a field. *Lastrea oreopteris* is frequent in old woods, and so is *L. spinulosa*. In most hedgebanks in the south grows *Scolopendrium vulgare* frequently side by side with *Asplenium trichomanes*, which here luxuriates in dry shady banks rather than old walls, for one simple reason—old walls are exceedingly scarce. *Asp. ruta-muraria* grows sparingly on the ruins of Beaulieu Abbey, and *Ophioglossum vulgatum* on Ashley Common. *Lastræa thelypteris* grows somewhere in the vicinity of Lyndhurst; the exact spot I

have not hitherto been able to discover. The Fir Club-moss (*Lycopodium selago*) occurs on Setley Heath and near the old Beaulieu Road station.

Of mosses I have collected many fine and interesting species. *Anomodon viticulosus* is frequent on trees, and so is *Neckera pumila*, which fruits at Knyghtwood. *Campylopus brevipilus* is common on the borders of some woods; near the sea we have *Orthotrichum phyllanthum*, and at Sway *Leptodon Smithii*. About fifty species of *Hypnum* have come under my notice, and probably several others occur. Among these are *H. cæspitosum*, *H. glareosum*, *H. megapolitanum*, *H. illecebrum*, and *H. chrysophyllum*. In some of the woods near Brockenhurst *H. triquetrum* fruits abundantly, and *H. scorpioides* grows to a very large size; I have seen it nearly a foot in length. *Splachnum ampullaceum* occurs in the bogs, and the Sphagnums include some very curious forms, which it will probably be less difficult to identify when Dr. Braithwaite's new work is published.

The New Forest may perhaps be regarded as the metropolis of corticolous lichens, while the saxicolous sections are either very poorly represented or altogether absent. The Graphidei are very abundant, and in this tribe I have collected such species as *Graphis dendritica*, *Opegrapha lentiginosa*, *O. viridis*, and *Arthonia punctiformis*, some of which are common, and I have found many of the rarer *Calicia* generally distributed. At Knyghtwood, not far from the famous Knyghtwood Oak, the largest oak in the Forest, may be seen within a few yards of each other three interesting cryptogams: *Pannaria rubiginosa*, *Stictina limbata*, and *Hypnum loreum*, and at no great distance *Ricasolia lætevirens* fruits abundantly. On Roydon Common, near Brockenhurst, grows the curious *Pycnothelia papillaria* with inflated podetia, and in the Hinchelsea woods the delicate little *Normandina pulchella*, which has something of the appearance of a pale blue scale-moss. The species of *Lecidea*, *Lecanora* and *Verrucaria* are "too numerous to mention."

And now in conclusion I have just two words to say as to the Diatomaceæ, of which I have collected a considerable number of species in this neighbourhood. I find my notes have already stretched to such a length that I cannot even mention the names of many interesting forms; three species, however, on account of their rarity, deserve brief mention. The first is the pentagonal variety of *Amphitetras antediluviana;* the discovery of which I recorded in SCIENCE-GOSSIP in January, 1877. It is rare, and always accompanies the more common form, the var β. All those who have seen it will, I am sure, agree that it is one of the most striking and beautiful of British diatoms. The next is *Surirella elegans*, figured in SCIENCE-GOSSIP, vol. iv. p. 132, a diatom identical with the *Sur. sclesvicensis* of American deposits, but which as a British species appears to be very little known among diatomists. It has occurred in almost all my bog gatherings, sometimes in abundance and of very large size; indeed I look upon it as about the commonest of our *Surirellæ*, excepting perhaps *S. biseriata*. Lastly, another of the same genus described and figured as a new British diatom in SCIENCE-GOSSIP, vol. v. p. 61, under the name of *Surirella Capronii*, a species differing from all others of the genus by the possession of two hornlike processes springing from the median line. I found it in small numbers in a salt-marsh gathering, and my specimens are very much larger and finer than the ordinary forms of *S. splendida*. The only British locality for it then given was Shere, in Surrey.

This brings my remarks on the fauna and flora of the New Forest to a close. Very imperfect they cannot fail to be, since only a few species have been selected to illustrate each section; and even my own lists, compiled from personal observation and comprising some thousands of names, are in almost every department still far from approaching completeness. But there are many naturalists devoted to special branches who might add largely to our knowledge of the rich natural resources of one of the most delightful, interesting, and exhaustless districts in the United Kingdom.

NET LIGHTNING.

By the Rev. S. BARBER, F.M.S.

HOW glorious and awe-inspiring a spectacle is presented to the student of nature's mysteries, when, flashed in an instant through the impenetrable gloom of night there stands out before his unsuspecting sight a varied and sublime expanse of cloud scenery, distinctly revealed; towering crags, dark abysses, and every lineament of its gorgeous structure, traced sharply out by the dazzling and unearthly splendour of the lightning.

By daylight, in such a condition of the atmosphere, when the electrical tension of the individual cloud masses towards each other and between these and the earth is unusually strong, we cannot fail to observe the sharpness of definition, apparent solidity and great volume which the cumuli exhibit. There is, however, no more remarkable characteristic observable at these times of electrical disturbance than the individuality of structure, if I may so express it, which they present to view; an individuality of form which appears to be intimately related to the electrical tension of each mass of vapour. This may be well seen when two highly condensed and vertically posed peaks rise aloft, and drawing into close proximity to one another, leave a long narrow interstice with jagged edges between them. (See fig. 123.)

Such an appearance is probably never seen in settled weather, being, in fact, one of the most striking indications of electrical excitement. The forms illustrated in the sketch are perhaps rather evidences of repulsion than attraction between the masses.

Sir W. Snow Harris, in his treatise on electricity,* suggests the following as a brief explanation of the discharge between the clouds and the earth: "If," says this writer, "we consider attentively the electrical conditions of a thunderstorm, we may observe in them all the elements of the Leyden experiment: the atmosphere in fact becomes a great coated pane, regard to the air which forms their base. Thus one large, leading cumulus may become a centre of force ready to operate, not only on the earth beneath, but on various collateral masses of the surrounding vapour, when the general equilibrium is disturbed.

The tension, then, becoming too great, and the balance of forces being disturbed, the discharge

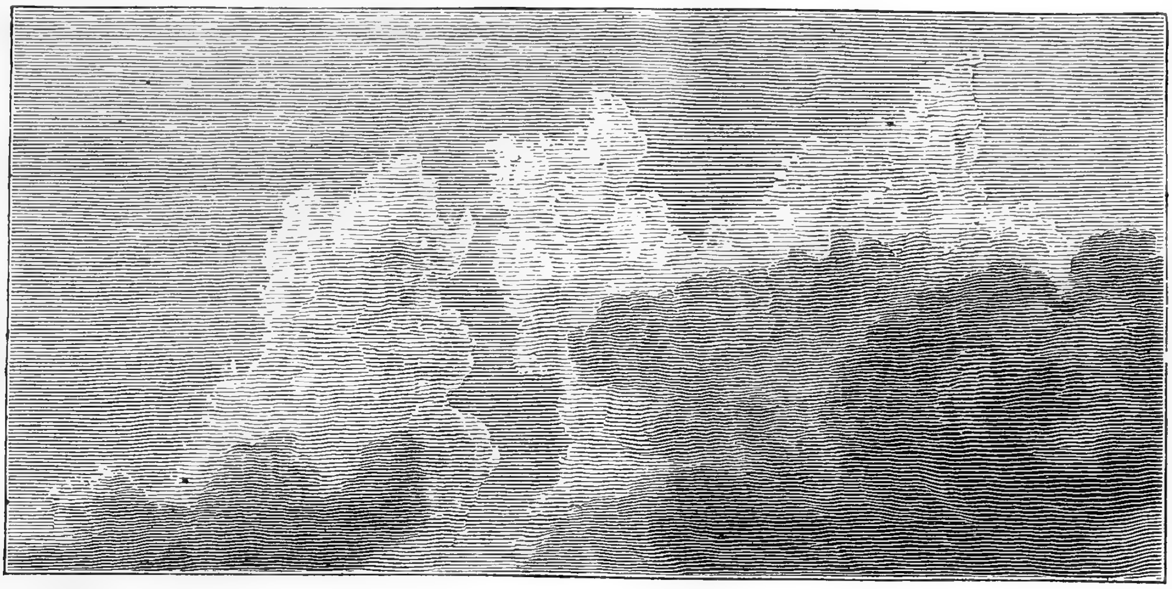


Fig. 123.—Approach of Electrical Cloud-masses.

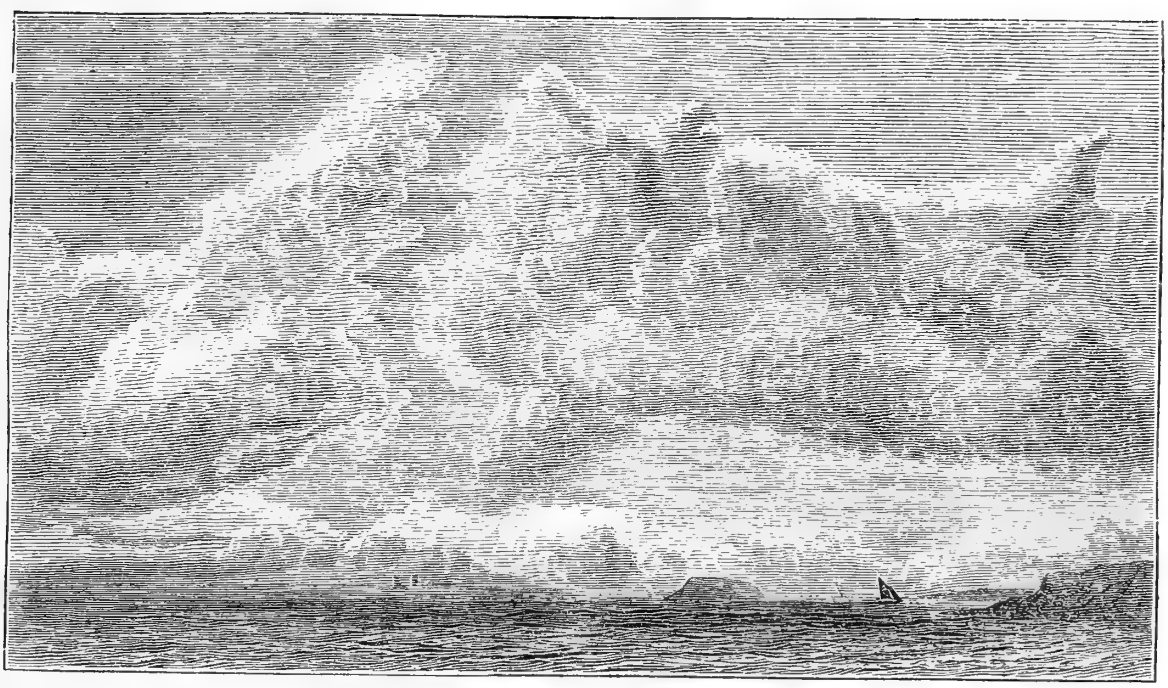


Fig. 124.—Approach of Electrical Cloud-masses, seen in perspective.

or fulminating square, of which the charged cloud is the insulated and the surface of the earth the uninsulated, terminating conducting planes; the phenomena of thunder and lightning are neither more nor less than disruptive discharges through the intervening air."

In explaining the thunderstorm by reference to the principles of electrical induction, and of the disruptive discharge, the reader will observe that much depends upon the condition of the air contiguous to the earth and subjacent to the cloud—in regard to conductive power.

And it may well happen that large masses of cloud, separated, perhaps by intervals of several miles, may be very differently situated in this respect, with

* Sixth ed. Virtue & Co.

ensuing would connect together the different points—centres of the masses—and these again with the earth. The instantaneous dissolution of a polygon of forces in this way, would, through the electric current, darting from point to point, involve an interlacing or net-work pattern in the lightning flash.

Vast, however, as is the force which the lightning wields, an apparently slight circumstance may direct its course. The configuration of the earth beneath as affecting the upward vapour currents; the presence of smoke or metallic dust might be responsible for effects most disastrous to man; so delicately balanced are the forces of nature.

Such atmospheric conditions may perhaps be

suggested as the origin of that rare and magnificent phenomenon which we have here denominated "Net"* lightning—one of the most glorious evidences of the power and majesty of Him who creates and upholds the universe; every atom in the dust of the balance being, as Charles Kingsley beautifully puts it, "distinctly and deliberately divine." Each particle is, indeed, if we but knew one half of the laws by which it is actuated, as much a witness to the science and the "Art of God,"† as the Kosmos itself; as distinctly the handiwork of the Great Artificer as is the majestic expanse of the starlit sky.

THE HISTORY OF THE CUCUMBER (*CUCUMIS SATIVUS*).

By H. G. Glasspoole.

The cucumber is known to have been cultivated for more than three thousand years. In ancient Egypt it was extensively grown, and is so at the present day; the succulent nature of the plant enabling it to resist the drought of the sandy plains, while it flourishes well in the richer soils watered by the Nile. The want of this vegetable was one of the grievances complained of to Moses by the Israelites in the wilderness; we also find it mentioned in other parts of Scripture. The cucumber is mentioned in a particular manner by some of the early Greek writers on plants. Theophrastus, writing on the cucumber, enumerates three varieties—the Bœotian, Scytalic, and Laconican; the last, he states, thrives better with watering than the others. Diocles, of Carystus, an ancient town of Greece, tells us that the cucumber eaten with sium at the first course of a meal makes the eater uncomfortable, for it gets into the head as the radish does, but that if eaten at the end of supper it causes no uncomfortable feeling and is more digestible. We are told that the farmers of those days considered that if their seed was steeped in the juice from the root of the cucumber it would be protected from the ravages of insects.

Cucumbers grown in the neighbourhood of Antioch were considered by the ancient Greeks the finest. Columella, one of the oldest Roman writers on agriculture, mentions that the inhabitants of Mendes in Egypt were accustomed to take the largest bramble-bush they could find, transplant it to a warm, sunny spot, cut it down at about the time of the vernal equinox to within a couple of fingers of the ground, then insert a seed of the cucumber into the pith of the bramble, the roots of which were well covered over with fine earth and manure to withstand the cold. By this plan they were enabled to have cucumbers all the year round. This same author states that cucumbers ought to be propagated from seed that has been steeped in milk and honey for a couple of days, this method having the effect of rendering them sweeter and pleasanter to the taste. He also gives directions to his own countrymen for forcing this plant by artificial means. Those who wish to have them early, he says, should plant the seed in well-dunged earth, put into osier baskets, that they may be carried out of the house and planted in warm situations when the weather permits. The baskets may be put upon wheels so that they may be brought in and out with less labour, and as soon as the season advances the baskets may be sunk in the earth. Pliny states that in Italy the cucumbers are small, but in some countries are remarkably large and of a wax colour or black. Those from Africa are most prolific. He mentions that by nature the cucumber has a wonderful hatred of oil, but has a great affection for water. Of this fact, he says, we may be satisfactorily convinced in a single night, for if a vessel filled with water is placed four fingers distant from a cucumber it will have descended into it by the following morning—but if the same is done with oil it will assume the curved form of a hook by the next day. This same author tells us that the Emperor Tiberius was so fond of cucumbers, and took such pleasure and delight in them, that they were served up at his table every day all the year round. The beds and gardens wherein they grew were made upon frames so as to be removed every way with wheels, and in winter during the cold frosty days they would be drawn into certain high-covered buildings exposed to the sun, which was admitted through frames or lights covered with lapis specularis, probably talc or some transparent mineral, which the Romans knew well how to split into thin laminæ, so that light might be transmitted through it. This appears to be the earliest account of forcing plants which we read of in ancient times (Phillips, "Pomarium Britannicum").

The Romans, from the remains of their villas found in this country, appear to have been acquainted with the art of heating their rooms with flues and hot water, and from this we are led to believe that cucumbers and other vegetables were extensively forced during the days of Roman splendour. Pliny mentions that a new variety of this plant had accidentally been produced in his time in Campania, the fruit of which was of the form of a quince; it did not grow hanging, but assumed its round shape as it lay on the ground; the seeds from this produced similar plants. The name given to this variety was Melopepo (Fée says that this is the melon, the *Cucumis melo* of Linnæus). Pliny appears to have considered this vegetable unwholesome in an uncooked state, as he tells us it will live in the stomach until the next day, and cannot be reduced to food, but when boiled and served up with oil, vinegar, and honey they make a delicate salad; he also recommends a pinch of the seed beaten up with cummin and taken with wine as a good remedy for a cough.

* A reticulated pattern, instantaneously impressed upon a large expanse of sky.

† Such is the term applied to Nature by Sir Thomas Browne.

We have no precise date when the cucumber was first cultivated in England. It may have been introduced with other fruits and vegetables at the time the Romans were masters of this country. According to a note in Gough's "British Topography," vol. i. p. 134, it was, with the melon, commonly cultivated in the reign of Edward III. (1327), but in consequence of the wars between the Houses of York and Lancaster the cultivation of them, like other plants, became neglected, and at last entirely lost. It was introduced again at the later part of the reign of Henry VIII.

Our old friend Gerard mentions them thus in his Herbal (1596): "There be divers sorts of cucumbers, some great, others lesser, some of the garden, some wild, some of one fashion and some of another. There be also certain long cucumbers which were first made (as it is said) by art and manuring, which nature afterwards did preserve, for at first when the fruit was very little it is put into some hollow cane, or other thing made for the purpose, in which the cucumber groweth very long by reason of that narrow hollowness, which, being filled up, the cucumber increaseth in length. The seed of this kind being sown bringeth forth not such as were before, but such as art has framed which of their own growth are found long and ofttimes very crookedly turned, and therefore they have been called Anguine, or long cucumber." Gerard extols the cucumber "mixed with oatmeal pottage and eaten at every meal for three weeks as a perfect cure for persons afflicted with flegme and copper faces, red and shining fierie noses (as red as roses) with pimples, pumples rubuse and suchlike precious faces; but at the same time they are to be sure to wash their faces with a decoction of vinegar, orris root, camphor," etc. This old author also gives the earliest direction in this country for making hotbeds for cucumbers. He directs that they should be covered with mats over hoops, as glasses were not known at that time.

Lord Francis Bacon, who wrote about 1598, says cucumbers "will prove more tender and dainty if their seeds be steeped in milk. The cause may be for that the seeds being mollified in milk, will be too weak to draw the grosser juices of the earth, but only the finer." He adds, "cucumbers will be less watery if the pit where you set them be filled half way with chaff or small sticks, and then pour earth upon them; for cucumbers, as it seemeth, do exceedingly affect moisture, and over-drinketh themselves, which this chaff or chips forbiddeth." He also states that in his day "it was the practice to cut off the stalks of cucumbers immediately after bearing, close by the earth, and then to cast a pretty quantity of earth upon the plant that remaineth, and they would bear fruit the next year, long before the ordinary time. The cause may be for that the sap goeth down sooner, and is not spent in the stalk or leaf, which remaineth after the fruit; where note, that the dying in winter of the roots of plants that are annual, seemeth to be partly caused by the over-expense of the sap into stalks and leaves, which being prevented, they will superannuate, if they stand warm."

Parkinson, in his "Paradisus," 1656, tells us that in many countries they do eat cucumbers as we do apples and pears, paring and giving slices of them as we would to our friends of some dainty apple or pear. The cucumber was not generally cultivated till almost the middle of the seventeenth century, and it is stated that the first successful forcer of this plant in England was Thomas Fowler, gardener to Sir Nicholas Gould, of Stoke Newington, who presented a brace of well-grown fruit to King George I. on New Year's Day, 1721; the seeds from which they were raised were sown on the 25th of September. Some years ago the cucumber was cultivated in large quantities in the outskirts of London, and it is stated in Dr. Wynter's "Curiosities of Civilisation," page 229, that fourteen acres might be seen under hand-glasses in a single domain, and that it has been known that 200,000 gherkins have been cut in a morning for the pickle merchants. It is also stated that cucumbers have refused to grow well around London ever since the outbreak of the potato disease. In Loudon's time large quantities were grown in the fields of Hertfordshire without the aid of glass for the London markets during the summer months. The village of Sandy in Bedfordshire has been known to furnish 10,000 bushels of gherkins in one week for pickling purposes. The cucumber, notwithstanding its extensive use among all classes in this country, is considered unwholesome by most medical practitioners. Dr. Doran, in his "Table Traits," mentions that in the days of Evelyn (1699) the cucumber was looked upon as only one remove from poison, and adds that it had better be eaten and enjoyed with that opinion in memory. Abernethy also gave a quaint recipe for its use, which was to peel the cucumber, slice it, pepper it, put vinegar to it, then throw it out of the window. The extent to which the cucumber is consumed by the inhabitants of Egypt and the South-west of Asia, but also in European Russia and Germany would scarcely seem credible in this country. A correspondent of the "Daily News," in the summer of 1874, returning from the fair of Nijni-Novgorod, was struck with the profusion of water melons and cucumbers everywhere offered for sale. Pyramids of melon and water-melons, like cannon-balls in an arsenal, were heaped up in every direction, and as for cucumbers, you could not help fancying that a plague of them, like locusts, had descended upon the earth. You never see a Russian peasant at dinner but you see the lump of black bread and a cucumber. The cucumber seems certainly a singular dish to be so national in a country with a climate like Russia. It is the last that one would have selected à priori for the post; but this is only one of the great many singularities one meets with. The cucumber costs about the thirtieth part of a penny about

the Volga; perhaps this fact will explain the anomaly. (See "Gardener's Chronicle," 24th Oct. 1874). Some writer says there used to be a great annual fair at Leipzig for cucumbers, when the streets were heaped up a story high with that precious element of German cookery. In Germany barrels of half and also full-grown cucumbers are preserved from one year to the other by immersion in deep wells, where the uniform temperature and exclusion from air seem to be the preserving agents.

Nothing can be more agreeable to our olfactory nerves on a hot summer's day than the refreshing and cooling scent of a fresh-sliced cucumber, but perhaps it is not generally known that in the art of perfuming it finds its way to the toilet-table under the form of cold cream and milk of cucumbers. The large seeds of this tribe are employed instead of almonds in making cheap sugar-plums. The word cucumber is derived from the Latin *cucumis*, meaning the same thing. Some time since there was a controversy carried on in "Notes and Queries" as to the proper pronunciation of the first syllable, whether it should be *cow* or *cu.* Parkinson (1656) writes it "cowcumber," by which name it is called by the uneducated, but people with any education would never think of writing or pronouncing it otherwise than "cucumber." Tartary has been assigned to this species of cucumber as its native country, but upon what authority is equally questionable with that of the melon. No modern traveller appears to have found it wild.

OUR COMMON BRITISH FOSSILS, AND WHERE TO FIND THEM.

No. VII.

By J. E. Taylor, F.L.S., F.G.S., &c.

It is with a sense of delighted relief that we once more resume this series of articles; which have been

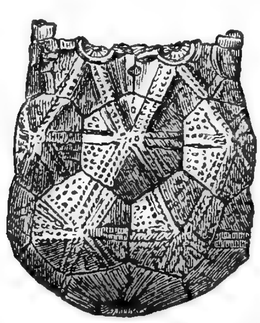


Fig. 125.—Extinct kind of Free Crinoids *(Marsupites Milleri)*, from White Chalk.

Fig. 126.—*Pentremites florealis*, one of the *Blastoidea*, from Carboniferous Limestone. *a*, Profile; *b*, summit; *c*, base or pelvis.

unavoidably interrupted by a too prolonged pressure and strain of other literary work. We propose in the present article to call attention to the commonest fossils belonging to the Star-fish and Sea-urchin family. Few fossils have a prettier or more attractive aspect than they, and none exceed them in the singular beauty of their structures, and their marvellous adaptation to their ancient habits of life.

Now that we have got rid of the useless term "Radiata," and are beginning to arrange animals in their natural relationship to each other, we have

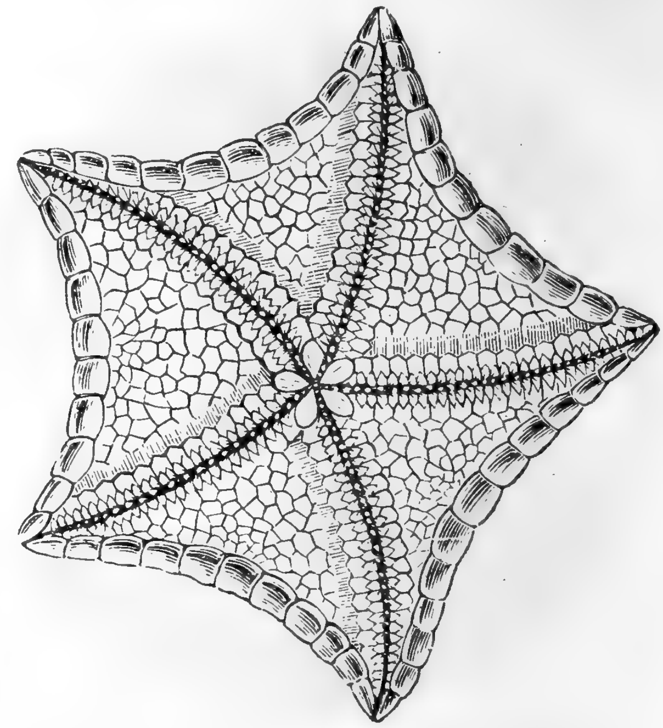


Fig. 127.—*Asterias tessellata*, one of the Cushion-stars.

Fig. 128.—"Five-fingers" Star-fish *(Uraster rubens)*.

begun to learn comparative zoology. To this most interesting study the whole science of palæontology—or that which deals with the extinct life of our globe—contributes equally with zoology. In surveying such a large natural group as that formed by the annuloid animals, we are frequently surprised by the singular way in which otherwise extreme types spring from almost common or neutral ground. Thus, the extinct groups of Cystideans and Pentremites, peculiar to the Palæozoic rocks, and which severally represent two different orders, in some measure come as near to the Encrinite family on one side as the Pouch Encrinite (Marsupites) of the chalk formation does both to them

and the Echini on the other. The Cushion-stars (Goniasters), run very near to the Cake-urchins or Clypeasters, although the former are star-fishes and the latter sea-urchins, and perhaps both these touch as nearly as any of their class to the Cystideans, Pentremites, and Marsupites.

Fig. 129.—Portion of one of the arms of "Brittle Star" *(Ophiocoma rosula)*, showing the claws or hooks.

Fig. 130.—Separate hooks of "Brittle Star" *(Ophiocoma rosula)*, much magnified.

Both star-fishes and sea-urchins are, geologically speaking, exceedingly ancient. With the exception of certain Brachiopoda, we know of no other group of animals which have maintained their peculiar shapes for a longer time than the star-fishes. As far back as the Cambrian period we find two well-differentiated orders in existence, one represented by the modern "five-fingers" (Uraster) and the other by the brittle-stars (Ophiura). Evidently these two types have been in existence throughout all the silent revolutions, physical and biological, which have so often taken place on the surface of the globe, and our modern star-fishes are as lineal and directly uninterrupted descendants of these early Cambrian fossil forms, as mankind are from their "first parents."

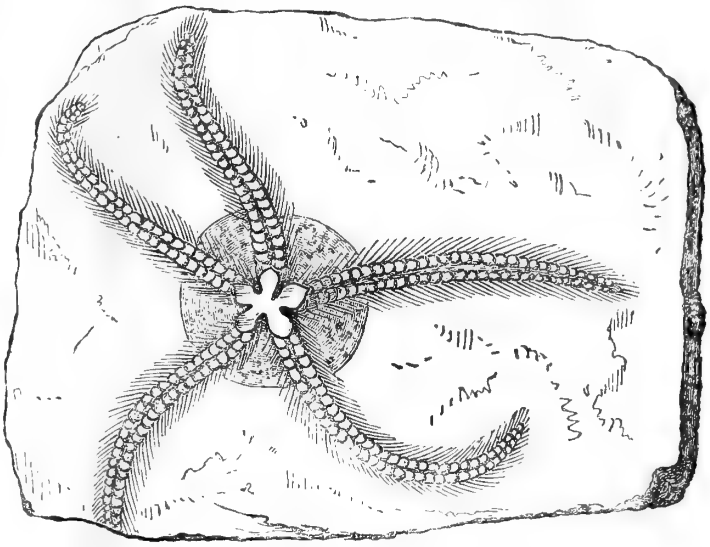


Fig. 131.—Fossil "Brittle Star"-fish *(ProtasterMiltoni)*. Upper Ludlow Rocks, Leintwardine.

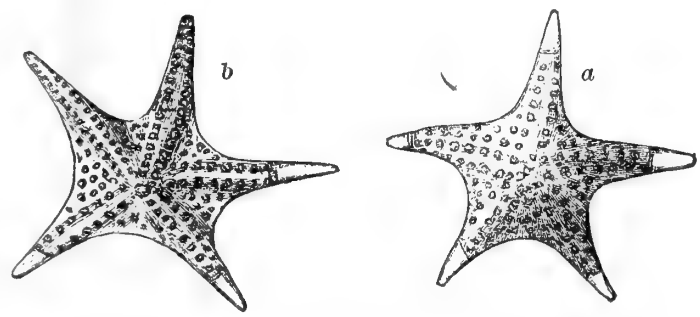


Fig. 132.—Fossil Star-fish allied to the modern "Five-fingers" *(Palasterina primæva)*, *a*, upper surface; *b*, lower surface, Ludlow Rocks.

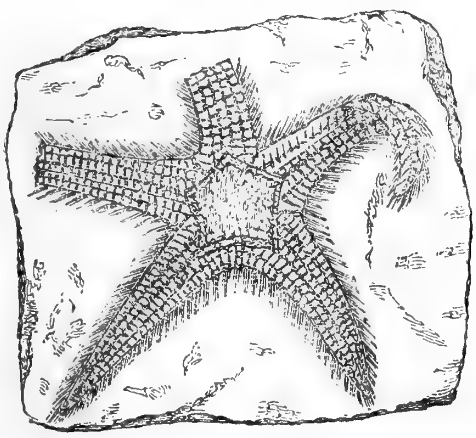


Fig. 133.—Fossil Star-fish *(Palæocoma Marstoni)*, Lower Ludlow Rocks.

The upper part of the skin of such star-fishes as the "five-fingers" (*Uraster rubens*) is thickened and roughened and strengthened by the presence of grains or irregular spicules of carbonate of lime. If each of these grains had gone on increasing in size by addition to its margin, they would have grown until they touched each other, but would not have fused, and then we should have had regular plates instead of grains, and the whole body would have been covered by a kind of tessellated pavement. This is exactly

how the arms of the Brittle-stars (Ophiuridæ) and the margins of the arms and body of the Cushion-stars (Goniaster and Asterias) have been so regularly and beautifully armed, the former even more effectually than a mediæval mail-clad knight. The two groups so anciently separated, are easily recognised. Thus the "five-fingers" and "sun-stars" (Solasters) so abundant on our British coasts have the under surfaces of their arms grooved. In and out of these grooves we perceive rows of small, white, grub-like objects which slowly wriggle to and fro if we turn a star-fish on its back, and finally end by bending over and attaching their tips to the rock by means of suckers. Then by an united exertion they pull over the star-fish to its proper position. A young observer has not long to experiment on living star-fishes before he finds that these grub-like objects serve all the purposes of feet—that the star-fishes can glide along even perpendicular surfaces by their means. They are hundreds in number, but all are fashioned alike, and the mechanism which renders them locomotive organs is of the most wonderful character. These feet are termed by naturalists ambulacral, but we defer a detailed description of them until we come to speak of the Sea-urchins. The stomach of this kind of star-fish is continued up each arm, and this fact naturally groups together genera which may have a greater number of arms than five, as the "sun-stars" (Solaster) which have twelve.

In the "brittle-stars" (Ophiuridæ), on the contrary, the stomach does not extend to the arms, although the nervous branches of the ganglion surrounding the mouth do. The "sun-stars" have only *two* rows of suckers, whilst the "five-fingers" possess *four*. In the "brittle-stars" we have the central disc covered with jointed calcareous plates, and the arms defended by four rows of the same. There are no sucking feet, however, but the arms are employed as organs of locomotion, in which they are aided, as Mr. Fred. Kitton has shown, by short hooks which take hold of the surface and thus obviate the necessity of sucking-feet. Nature has usually more than one way of meeting a difficulty, and this is a case in point with the progression of the star-fishes.

Many star-fishes are characteristically deep-sea animals, and perhaps the Echinodermata, to which both star-fishes and sea-urchins belong, range to and continue over deep parts of the ocean-bed, more than any other group of marine animals. Thus, during the deep-sea dredgings of the "Challenger" we find such genera as *Ophiomusium*, *Archaster*, &c., dredged up, the latter from more than a mile and a half depth of sea water. A large star-fish, called Leptychaster, allied to our Luidia, was brought up off Cape Maclear, Kerguelen's Island, in very deep water. Another genus, Hymenaster, was found to be very widely distributed over the sea-floor, and at depths ranging from about half a mile to more than three miles. Star-fishes and their allies, sea-urchins, are usually the commonest fossils of the Chalk formation, which we know was an oceanic deposit formed under very similar circumstances to the "globigerina ooze" of the mid-Atlantic. Dr. Wallich showed, when sounding in the "Bull Dog" for the first Atlantic cable, that the ocean floor was occupied by star-fishes, for these animals came up attached to the sounding-lead, and this incident first broke people's faith in the old-received notion that absence of light in the deep sea rendered it a desert for all bottom animals except the Protozoa.

The *Asteridæ* (represented by our common "five-fingers"), and the Ophiuridæ or "brittle-stars," as we have said, are found in Cambrian rocks. We have seen specimens better preserved in the fossil state than dried recent specimens usually are in museums. Sea-urchins also lived in the Palæozoic epoch, but they do not appear to have thriven well. Only two genera are known, and these are represented by but few species during periods long enough to form strata thicker than all the Secondary deposits taken together. But when we come to the Secondary period we find the Sea-urchins gaining ground. By-and-by, as in the Chalk formation, they are wonderfully common, and of multitudinous shapes and types. But by this time the Encrinites, which we have seen were so plentiful on the floors of primæval seas, had begun to decline. Broadly, therefore, it may be stated that the Sea-urchins begin to flourish just when the Encrinites commenced to decline.

The fossil star-fishes are not as a rule abundant, unless perhaps, we except a particular stratum in the Middle Lias, where they are so plentiful that the seam is called the "star-fish bed." At Leintwardine, where the Lower Ludlow rocks crop up and are quarried, we meet with both the kinds of fossil star-fishes of which we have been speaking. Speaking of *Protaster Miltoni* (one of the ancient "brittle stars"), Mr. Salter says it is "abundant, and of all sizes," meaning, we suppose, in various stages of growth. Few localities are better worth a geological pilgrimage than this part of Shropshire. It is only six miles from Ludlow, where the celebrated "Bone-bed" of the upper Silurian rocks may be advantageously studied. The Lower Ludlow rocks at Leintwardine are not much quarried, for they are a kind of "mud-stone," of little commercial value. Otherwise there is no doubt the number of fossil star-fishes which would be exhumed would be immense. Unfortunately, since Mr. Salter's time, the quarry where the fossil star-fishes were once so abundantly found has been either worked out, or excavation has been discontinued. Mr. Marston, of Ludlow, has a splendid series of these fossils, among them *Protaster Marstoni*. Shepherd's Quarry, near Ludlow, is another good hunting-ground. In some respects, one species, perhaps the most beautiful of the entire group, named after Professor Sedgwick (*P. Sedgwickii*), is allied to the "Feather-stars" (or rather to one division of them called Euryale

on account of the peculiar spines on the plates of its arms. This species is found only in the older rocks, such as the Caradoc beds at Bala, on the west side of the beautiful lake. At Benson's Knot, Docker Park, and other places near Kendal, in Westmoreland, where the upper Ludlow rocks crop out and quarries are opened in them, a student may expect to find *Palasterina primæva*, and *Uraster Ruthveni*, the latter named after one of the most diligent and devoted of amateur geologists that ever lived. Both the latter fossils belong to the same group as our modern "five-fingers," and they have been beautifully preserved (as any one may see, who pays a visit to the Kendal Museum), in spite of the skin being only thickened and not plated, with calcareous spicules. Two species of fossil star-fishes have been found rather plentifully in the Cambrian rocks at Welshpool, Meifod, and Corwen. Next we come to the Lias strata for abundant star-fishes, and we have seen that one bed is especially rich in them. The Liassic species usually belong to the "brittle-stars," and the commonest of these fossils is *Ophiolepis Egertoni*, found at Staithe, near Whitby; and also abundantly in various places in Dorsetshire, especially at Seaborne. Specimens of this star-fish may be seen in nearly every museum in England.

The marginal plates or ossicles of star-fishes allied to the cushion-stars (Goniaster), are not uncommon in the Chalk, and in the flints which come from that deposit. In the chalk quarries at Gravesend, Charlton, many places in Kent and Sussex, as well as Norfolk (particularly about Norwich) remains of these Echinoderms may be found, but only by practised eyes. We have seen perfect specimens imbedded in the flint nodules obtained from Ipswich and Norwich. In the London Clay of the Isle of Sheppey we find similar remains of Goniasters; ossicles, plates, &c., in a more or less perfectly preserved condition.

We should be glad to hear from any of our geological correspondents further details respecting the "star-fish bed" in the Lias—its locality, extension, species, &c.; and, indeed, concerning any fossil star-fish locality.

MICROSCOPY.

Euglena viridis and its Sucker-bulb.—I am glad to note further confirmatory evidence in your columns with reference to the existence of a bulb or sucker at the extremity of flagellum in *Euglena viridis*, and may further remark that Mr. George Harkus notes a central darkening or marking, indicating a tubular structure in this organ (this gentleman's sketches were enclosed to the Editor with original query, and no doubt their accuracy would be observed). Will Mr. F. Jas. George say if he has detected the bulbous termination in all examples, or only in those obtained from special localities? In some quarters the statement of its existence has been received somewhat dubiously, but this may arise from the certain fact that only an objective of the best defining and resolving power will determine it. We (Mr. Harkus and I) found a Ross quarter inch, and a Swift's eighth to work well upon it, an immersion sixteenth had not sufficient penetration, but still revealed the bulbs coarsely. Perhaps the following observation may explain to your correspondent how the Euglena became metamorphosed into rotifers. Last autumn I obtained from a pond *Euglena sanguinea* in profusion. Griffiths and Henfrey regard this as the perfect form of *Euglena viridis*: the gathering was placed in a vessel covered with a sheet of glass, and in a few weeks assumed the still or protococcoid form, gradually in this interval changing in colour from red to green, the whole mass sunk to the bottom of the vessel, and during the winter continued to segment and increase by division, until now a portion has reverted to the *Euglena viridis* in its motile form, this confirms the opinion of authorities named above. I can substantiate Mr. F. Jas. George's remark, that the place of the Euglena "was taken by the common Funnel Rotifer." In my experiment, I find a fine and most interesting variety of rotifers, but I also invariably see the internal cavity of these individuals well stocked with what may be regarded as the zoospores, into which Euglena in its still condition segments, divides, and then breaks up. In fact these rotifers subsist upon Euglena. Could it be shown that Euglena was the larva of anything, the question of its animalism would of course be settled; will the existence of the bulb siphon, sucker, or whatever it is, assist in determining it?—*M. H. Robson, Newcastle-upon-Tyne.*

A New Method of Preserving Infusoria.—Would T. C. kindly furnish more particulars of the mixing solutions? I do not understand what he means by chromic oxydichloride acid. Is it dichloride of chromium? I have some of this in solution saturated and slightly acid; but he does not state the strength or percentage either of this or of the permanganate of potash, so that I am puzzled to know how to mix it.—*T. B.*

Microscopic Cleanliness.—Amongst the many difficulties with which the working microscopist is surrounded, none (in a small way) is more general and annoying than the difficulty he experiences in keeping his hands perfectly clean. Let him be as particular and careful as he may, stains of balsam, pigments and varnishes, and smears of the thousand and one sticky and discolouring materials with which he has to deal *will* get upon his fingers, and to remove them he often finds to be a matter involving much time and trouble. Soap and water won't touch them, ether is expensive, and turpentine or benzole is dirty and offensive in smell. Mr. Archer, of Liverpool, has recently patented a small slab or block

of pumice stone, the surface of which is chased into quadrangular facets or dice, and which has been christened the Patent Chequered Pumice Tablet. In this little article the practical microscopist will find a true friend. All he has to do, whilst washing the hands, is to use this little scrubber with its faceted surface well covered with soap, and he will find all stains and smears vanish under its action, as if by magic. Such, at any rate, is my experience, and I have been so well pleased with it that I have thought it worth while thus to bring it under the notice of my fellow-workers, in order that they may share the satisfaction which I have experienced from its use.—*Dr. M.*

Another Method of Staining Microscopical Specimens.—Dr. G. Brösicke, of Berlin, recommends a combination of osmic acid and oxalic acid for staining the tissues, instead of osmic acid alone. Small pieces of the tissue, or prepared sections, are placed for an hour in one per cent. osmic acid solution, and then carefully washed to remove all superfluous acid. They are then immersed for twenty-four hours or longer in a cold saturated aqueous solution of oxalic acid (one to fifteen), and are ready for examination in water or glycerine. The result is that while certain substances, such as mucin, cellulose, starch, bacteria, the outer coat of certain fungi, &c., are scarcely at all coloured, other tissues, such as the vitreous humour, the substratum of the cornea, the walls of the capillaries, and various intercellular connective tissues, appear of a bright carmine; and muscular fibres, tendon, hyaline cartilage, the interfibrillary substance of decalcified bone, and most of the tissues rich in albumen are stained a darker carmine. The grey substance of the central nervous system, most nuclei, and many cells assume a dark Burgundy red tint. In all these cases, however, each particular tissue is stained a slightly different shade, so that it can be readily distinguished from its neighbours. None of the objects treated by this method swell up, or exhibit signs of internal coagulation. The oxalic acid produces darker or lighter shades in proportion to the length of time the specimen had previously been immersed in osmic acid, and if the latter has once completely blackened the tissue, the oxalic acid is powerless afterwards to redden it. Mixed solutions of osmic and oxalic acids stain proportionally to the relative strength of each. The chief drawback to this method is the small penetrating power of osmic acid, which prevents the whole thickness of a specimen from being equally stained.

"Centerer" for Slides.—In your September number, 1875, you inserted a sketch of my "centerer." As I have altered and, I believe, improved it, I enclose a sketch of what I now use. The shaded part is a piece of wood about $\frac{1}{10}$ inch thick, screwed on the bed, which is about $\frac{1}{4}$ inch thick; sycamore is a good wood for it. I use a piece of paper about 2 inches long, and can thus have two different-sized holes punched, which I place under the centre of the slip. Under this I have a similar piece with two colours on each side, so that I can use either. I find black, white, blue, and red useful. The advantages

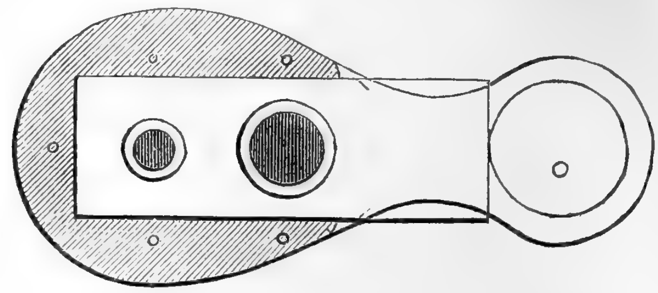


Fig. 134.—Improved Centerer for Slides.

of these alterations are that from the narrow neck and the shortness of the paper the glass is more easily handled, whilst we have more varieties on the same paper of colours or holes. I use a round button, putting the screw about $\frac{1}{8}$ inch from the centre.—*W. Locock, Clifton.*

Lead Cells.—Mr. M. A. Veeder, of Lyons, New York, recommends cells made from the thin sheets of lead with which tea boxes are usually lined. The depth of the cell may be increased, by placing several lead rings one upon another. Shallow cells may be formed with the greatest ease in this manner.

ZOOLOGY.

Mistakes of Instinct.—As a contribution to this subject, I may mention a failure of instinct in *Anthocharis Cardamines*, which has just come under my observation. I always find the eggs here laid on *Cardamine pratensis*, and always on the pedicel of the flower. When the flower-bud is very small, it is almost sessile; but still the egg will be found so placed as to avoid the floral envelopes, which being very caducous will have fallen before the egg is hatched, while it is the growing seed-pod which the young larva wants to get at. I had some *A. Cardamines* this year which were bred and laid eggs in a gauze cage upon cut flowers of Cardamine, and in one instance the egg was deposited upon the sepal of the flower, where in the natural course of things it must have perished.—*J. A. Osborne, M.D., Milford, Letterkenny.*

Simulation of Death by Insects. — In an interesting paper read not long ago before the Entomological Society, the simulation of death so frequently observed among insects was regarded not as an intentional stratagem to escape danger, but as a species of catalepsy due to terror, and was, if I mistake not, compared to the so-called fascination which certain birds and small mammals experience in presence of a serpent. It seems to me that the tendency to such simulation in different species is, roughly speaking,

inversely as their locomotive powers. Thus as far as the true insects are concerned, shamming death is most common among the Coleoptera, the order whose locomotive faculties are upon the whole lowest. Looking again at the different groups of Coleoptera, we find the tendency to simulate death absent, or at least very rare, among the tiger-beetles, carabs, and the Geodephaga generally; among the long-horns, which, when alarmed, rise in the air almost as readily as do bees or Diptera; among the Staphylini, which both fly, run, and fight well, and among the Elateridæ, which escape danger by a sudden leap. On the other hand, the semblance of death is often put on by the Lamellicornes, which are slow crawlers, blundering flyers, and are incapable of taking wing without some time for preparation. All these properties are still more decided in the genus Byrrhus, and here accordingly we find simulation at its height. At the mere sound or vibration caused by an approaching footstep, human or brute, a Byrrhus draws in its legs and assumes very effectively the appearance of a small stone or rounded clod of earth. Has a Byrrhus ever been taken on the wing, or recognised when flying? Among spiders the same distinction may be traced. The slower and more sedentary forms, if in presence of a powerful enemy, roll themselves up in a ball, and may easily pass unobserved. On the contrary, the wandering ground spiders, such as the Lycosæ, which in warm weather bound with such rapidity that they are sometimes by careless observers supposed to fly, rarely resort to this stratagem except when very persistently teased and intercepted.—*C. R. Slater.*

PEARLS IN PECTEN MAXIMUS.—Lately my friend, the Rev. H. F. Edge, was indulging in a dish of scallops, when he found something which he considered extraneous and improper in his food, but which on examination proved to be two perfectly spherical pearls, one considerably larger than the other, in fact as large as a small green pea, the other smaller, in colour milky white, similar to what I have from *Ostrea edulis.* Never remembering to have met with a similar case in *Pecten maximus*, nor of the circumstance being mentioned in Jeffrey's "British Conchology," I thought it would be of interest to SCIENCE-GOSSIP.—*John E. Daniel*, 6 *The Terrace, Epsom.*

HELIX LAPICIDA, *var.* MINOR.—My young friends, the Misses, are again to the fore; they were anxious to find *Helix lapicida;* they were successful, and more than so, for they brought me a number of the variety *H. l. minor.* Personally I do not remember having ever seen it before. The type, as most of your readers are aware, is, although not rare, very local. The locality is a wall in Downside, Epsom. I have no doubt they would gladly supply other collectors in exchange for other British land and fresh-water shells.—*John E. Daniel*, 6 *The Terrace, Epsom.*

CAPROS APER, OR BOAR-FISH.—In last month's number of SCIENCE-GOSSIP you have a record of specimens of *Capros aper* having been taken at Exmouth and Swanage, and I can now add to these Eastbourne, as two of my children found a fine specimen about $5\frac{3}{4}$ inches in length, on the beach close to the town, which was alive when caught, and retained its brilliancy of colour until put in spirits on the following Monday. I believe it is the first time it has occurred here.—*F. C. S. Roper, F.L.S. &c., Eastbourne.*

BOAR-FISHES AT THE BRIGHTON AQUARIUM.—Perhaps the following brief notes on the boar-fish (*Capros aper*) may interest some of the readers of SCIENCE-GOSSIP, as the subject has recently attracted attention in your columns. Its occurrence in the British Channel seems to be hardly so rare an event as supposed by your correspondent in the May number. In vol. ii. of Dr. Günther's "Catalogue of the Acanthopterygian Fishes in the British Museum," the Mediterranean is given as the usual habitat of the boar-fish, which is further stated to occur occasionally off Weymouth, Plymouth, and Brighton, and more rarely on the Irish coast. Its appearance on the Sussex coast is noted in Mrs. Merrifield's "Natural History of Brighton," and I believe Dr. A. Günther, F.R.S., caught the first specimen obtained off that town. There are at present two healthy boar-fishes in the Brighton Aquarium, captured about a month ago. In the summer months, the tank generally occupied by several beautiful specimens of varieties of the wrasse is rendered additionally attractive by the presence of this pretty little bright-coloured genus, which is by no means a bad show fish, despite an occasional preference for rocky corners. Its habits seem to resemble those of the dorys (Zeus), for, like them, it often remains nearly motionless in the water about halfway from the surface, and swims in the same stately manner. The boar-fishes once acclimatised are tolerably hardy in captivity, thriving well on a shrimp diet, but, as might be expected, they are very sensible to cold. They seem to have been more than usually plentiful this season, for Mr. Lawler, the curator of the Aquarium, informs me that twenty were caught together a short time back. The occurrence of the "poisson sanglier," according to M. Eugène Deslongchamps, is a much rarer event on the Normandy coast.—*Agnes Crane, Brighton.*

"A WONDERFUL DISCOVERY."—Under this title, the "Brisbane Courier" published a long and matter-of-fact-looking account of suspended animation, which has been republished in the English newspapers, and given rise to no small amount of comment. The "Courier" now acknowledges it has been the victim of a hoax, and all those people who have been contending for the possibility of suspending animation for months and years at will have been "sold."

PLATES OF BIRDS' EGGS.—An excellent coloured plate (27 inches by 16 inches, on sheet 29 by 21 inches) of European birds' eggs is published by Bouasse-Lebel, 29 Rue St. Sulpice, Paris, at two and a half francs. It contains 184 figures, natural sizes. Any French bookseller would supply it in London for about half-a-crown. The plate in question is No. 141 of the "Tableaux Synoptiques." The series comprises nearly 200 plates illustrative of almost every branch of scientific, mechanical, historical, social and domestic inquiry—which, so far as I know, are not equalled for quality and price.—*R. T. Lewis.*

BIRDS SINGING AT NIGHT.—On Monday, May 13, I heard several birds singing in the park here as late as half-past ten, the night being quite dark. On Tuesday, May 14, I also heard one or two about the same time. As there were (on the first night) several singing, I was unable to distinguish any but the thrush.—*F. W. J., Reigate.*

BIRDS SINGING AT NIGHT.—Having seen several notices of birds singing at night in SCIENCE-GOSSIP, I thought this might be worth mentioning. While staying at Maidstone last month (May), I heard a cuckoo distinctly at about 10.30 or 11 P.M.; the night was fine, and the nightingales were singing loudly.—*J. M. Ward.*

BIRDS OF INDIA.—At a recent meeting of the Zoological Society, the secretary exhibited and made remarks upon two volumes of original drawings of the birds in India, which had been deposited in the Society's library by Brigadier-General A. C. McMaster. The volumes contained about 270 figures of the birds of India, most of which had been drawn by soldiers in General McMaster's house at Secunderabad.

"NATURE CARED FOR, AND NATURE UNCARED FOR," is the title of a shilling pamphlet published by West, Newman, & Co., London. It is in reality a lecture by Mr. H. B. Hewetson, M.R.C.S., on "Ornithology," and is a thoughtful and reverent and well-expressed series of utterances on the mode in which natural phenomena impress the hearts of men. We have much enjoyed its perusal, although we do not always commit ourselves to the opinions of the author.

THE GREAT ATLAS MOTH.—We have received a copy of a monograph by P. H. Gosse, F.R.S., on the "Life-History of the Great Atlas Moth of Asia" (*Attacus Atlas*, Linn.), the largest known species of Lepidoptera, containing a beautifully finished coloured plate of its transformation. The work is published by West, Newman, & Co., London. The monograph is a careful study of the moth from specimens reared by Mr. Gosse from the egg to the adult stage.

THE TEACHING OF NATURAL HISTORY.—In a recent address Mr. Gladstone spoke as follows in favour of natural history teaching in schools:—I cannot help saying one word upon that subject which I think, on the whole, has been worse used in the schools of this country than all the other branches of knowledge. I mean that which is called Natural History. I speak of natural history, such as is open to you both by the study and by the observation of living objects and of dead objects in nature, such as continually come around and solicit your attention. I do not myself believe that natural history has had quite fair play, and I have always felt it most grievous among the many blanks of our early training that we were totally ignorant of it. I will just give you these four points in connection with natural history. In the first place, it is a continual lesson—a lesson at once easy and profound—of the wisdom and beneficence of Providence, a continual confirmation and belief, when you find the wonderful hand of that Workman descending to the smallest objects with the same care with which He mounts to the greatest. The religious use of natural history is one that all must delight in. The next point is this. Learning is an admirable thing, but it does not always make itself agreeable at the first introduction, at least that was my experience; I don't know whether it is yours. Much has been done, I believe, to improve these initial stages. It certainly is a marked advantage in the study of natural history that it leads you on by the hand; it inveigles you, if I may say so, into learning what is good and what is useful. Many a one might have his mind first opened to the attractions of natural history, which mind, if once opened, might perhaps be capable of applying itself beneficially to harder and more repulsive studies. Another point is this, natural history is one of the best and most efficient means for the education of the senses. Some may perhaps tell us that our senses are educated well enough already, and claim quite large enough a portion of our existence. Of course that is perfectly true so far as the grosser forms of enjoyment are concerned; but so far as the senses are concerned as organs for the acquisition of knowledge, they are very indifferently educated indeed. This habit of minute, careful, and accurate observation, which is inseparable from natural history studies, gives to the senses that habit of accurate distinction which is invaluable as an assistant in the pursuit of every branch of knowledge. Lastly, let me say that these analogies of natural history are invaluable; they have a most gracious effect in developing the finer faculties of the mind; they establish a connection between the different portions of creation.

HOW TO ESTABLISH A ROOKERY.—We wish to establish a rookery in the churchyard garden of St. John's, Waterloo Road, Lambeth. Will any of your readers kindly assist us by telling us the best plan to pursue?—*Arthur J. Robinson.*

GEOLOGY.

THE PRE-CAMBRIAN ROCKS OF CAERNARVON.—A paper on this subject has just been read by Professor T. M'Kenny Hughes, in which the author divides these rocks into (1) the volcanic series, (2) the felsitic series, (3) the granitoid series. He traces the former of these, consisting of coarser and finer varieties, from Caernarvon to near Port Dinorwig. Beyond these comes the felsite series, which is overlapped by grits and conglomerates as far as the Bangor road, north-east of Brithdir. Above the latter comes the "volcanic series," well developed in the neighbourhood of Bangor. The author is of opinion that the Cambrian conglomerate, with associated grits, may be traced in the edge of the older massif from Twt Hill, Caernarvon, to Garth Point, Bangor, and that the beds in each of these places and near Brithdir, recently described as separate, are identical; also that the bed with purple fragments near Tairffynnon and the Bangor Poorhouse are only Cambrian conglomerate faulted down. Further, he considers that the strata of the above three series are fairly parallel throughout, and that they only form three subdivisions of one great series.

THE GEOLOGICAL SOCIETY.—The following were among papers recently read at the monthly meeting: "On a fossil Squilla from the London Clay of Highgate, part of the Wetherell Collection in the British Museum." By H. Woodward, LL.D., F.R.S., F.G.S. The specimen described is preserved, as usual, in a phosphatic nodule, and exhibits five well-preserved abdominal segments (XIV.–XVIII.), a portion of the carapace, traces of the thoracic appendages, and the appendages of the twentieth segment preceding the telson. The abdominal segments increase in breadth posteriorly as in modern Squillæ. The species is most nearly allied to a recent Australian Squilla (unnamed) related to *S. Desmarestii.* The author proposed the name of *Squilla Wetherelli* for the London-clay fossil.

"On *Necroscilla Wilsoni*, a supposed Stomatopod Crustacean from the Middle Coal-measures, Cossall, near Ilkeston, Derbyshire." By H. Woodward, Esq., LL.D., F.R.S., F.G.S. The specimen described was found by Mr. E. Wilson, of Nottingham, in a nodule of clay-ironstone. It consists of the four posterior abdominal somites and the telson. The author discussed its zoological characters, which led him to regard it as approaching the Stomatopoda rather than the Isopoda. He thought it probable that Dr. Dawson's Diplostylus is allied to this newly discovered form, for which he proposed the name of *Necroscilla Wilsoni.*

"On the Discovery of a fossil Squilla in the Cretaceous Deposits of Hâkel, in the Lebanon." By H. Woodward, LL.D., F.R.S., F.G.S. This fossil Squilla occurs in a collection, chiefly consisting of fossil-fish, but also including several Crustacea and some beautifully preserved Cephalopods, obtained in the Lebanon by Professor E. R. Lewis, of Beirût. The specimens are in a compact cream-coloured limestone, most of the slabs of which contain examples of *Clupea brevissima* and *C. Bottæ*, fragments of *Eurypholis Boissieri*, and other fishes. Like the London-clay form, the species seems to be most nearly allied to the Australian species collected by Professor Jukes, and the segments are not ornamented with spines and ridges. The author proposed for it the name of *Squilla Lewisii.*

"On the Occurrence of a Fossil King-Crab (Limulus) in the Cretaceous Formation of the Lebanon." By H. Woodward, LL.D., F.R.S., F.G.S. This was another of Professor Lewis's discoveries, and was of much interest as helping to bridge over the interval between the Jurassic Limuli of Solenhofen and those now living. The author described the characters presented by the single specimen, for which he proposed the name of *Limulus syriacus.*

GIGANTIC REPTILES OF COLORADO.—Professor Cope describes the bones of a species of Camarasaurus, which he says represent a most gigantic animal. The transverse diameter of the neck vertebræ is fifty-six inches, and the diameter of the distal end of the femur is twenty-one inches. This reptile is found in the Oolitic formation of Colorado.

THE MIDLAND UNION OF NATURAL HISTORY SOCIETY, held their second meeting at Leicester, on May the 20th and 21st, and the proceedings were of a most satisfactory character. The societies in the union number about 3000 members. An address was delivered by Mr. George Stevenson; field excursions were conducted under the able leadership of Mr. W. J. Harrison, F.G.S., the energetic curator of Leicester Museum, and Mr. F. J. Mott; and conversaziones were held in the evenings. Next year the annual gathering will take place at Northampton.

REMAINS OF IGUANODON IN THE KIMMERIDGE CLAY.—Professor Prestwich has just described the occurrence of part of the skeleton of an Iguanodon found in the Kimmeridge clay near Oxford. The remains are evidently those of a young animal. The occurrence in this stratum proves that the Iguanodon was not confined to the lower Cretaceous and Wealden period as has been supposed, but that it existed during Oolitic times.

THE PHYSICAL HISTORY OF THE ENGLISH LAKE DISTRICT.—When the fittest man can be got to do required work, the result must be satisfactory. The Rev. J. Clifton-Ward, F.G.S., has just concluded a series of articles on the above subject in the "Geological Magazine," and they unquestionably form the best geological history of the Lake District which has yet been written.

THE GEOLOGY OF NORTHUMBERLAND.—Professor Lebour, F.G.S., of the College of Physical Science, Newcastle-upon-Tyne, has prepared an excellent geological map of the county of Northumberland, which is published by Andrew Reid, Newcastle. This map will be of great service to geological students.

THE ROYAL SCHOOL OF MINES.—The appointment of Professor F. W. Rudler, of the University College of Wales, to be curator of the Museum of Practical Geology, and registrar of the Royal School of Mines, Jermyn Street, in succession to the late Mr. Trenham Reeks, will give great satisfaction to all geologists throughout the United Kingdom.

UNDERGROUND GEOLOGY.—In a deep well-boring at Ware, Herts, the chalk and the gault were passed through, but the lower greensand was absent, and the boring tool at once struck upon upper Silurian rocks, lying at an angle of forty degrees, although unfortunately the direction of the dip is unknown. These rocks were found to be rich in characteristic fossils, twenty-eight species of which have been properly catalogued.

BOTANY.

ORCHIS MORIO.—In an upland meadow in South Beds, I have just obtained about a dozen spikes of this Orchis, showing every gradation of colour, from dark purple, through various shades of red and pink, to a pure white, with the exception of the characteristic green lines on the side sepals. The higher the general hue, the brighter was the green of these lines. The pollinia also varied with the colour of the flower. Those in the darkest varieties were tinged with purple, and those in the white one were a rich golden yellow. Very few insects had apparently visited these flowers, for in most of the spikes none of the pollinia had been removed, in others only two or three, and in no case were both removed from the same blossom. The visits of insects may have been prevented by the excessive rains of the last few days. —*J. Saunders, Luton.*

NUTRITION IN RELATION TO FLOWERS.—At a recent meeting of the Linnean Society, a paper by Mr. Thomas Meehan, the well-known American botanist, was read, in which the author's observations on *Wistaria sinensis*, *W. frutescens*, *Catalpa syringæfolia*, and *Limina perenne* were given. Mr. Meehan thinks that the struggle for power between the vegetative and the reproductive forces decides fertility, and suggests that the perfection of the polliniferous organs, and the consequent potency of pollen, is dependent on phases of nutrition involved in this struggle. Thus, in the above mentioned plants, it is seen that potency in pollen, the main element in reproductive force, operates only when there has been some check given to the force of vegetative growths.

INSECTS DESTROYED BY FLOWERS.—At a recent meeting of the Entomological Society, Mr. J. M. Slater sent a short paper on the above subject, in which he stated that, whilst it is generally admitted that the gay colours of flowers are mainly subservient to the purpose of attracting bees and other winged insects, whose visits play so important a part in the process of fertilisation, one important fact had scarcely received due attention. Certain gay-coloured or conspicuous flowers are avoided by bees, or, if visited, have an injurious and even fatal effect upon the insects. Among these are the dahlia, passion-flower, crown-imperial, and especially the oleander. That the flowers of the dahlia have a narcotic effect, was first pointed out by the Rev. L. Jenyns, who mentions that bees which visit these flowers are soon seized with a sort of torpor, and often die unless speedily removed. Mr. Jenyns also quotes a writer in the "Gardener's Chronicle," who pronounces the cultivation of the dahlia incompatible with the success of the bee-keeper. The passion-flower also stultifies bees, and bees of all kinds avoid the crown-imperial and the oleander, for the honey of the latter is fatal to flies. Mr. Slater did not remember ever seeing a butterfly or moth settling on the flowers of this shrub in Hungary and Dalmatia, and he thinks it important that observers should ascertain whether the above-mentioned phenomena be true, and, whether any insects in such cases undertake the functions generally exercised by bees, and whether flowers have a similarly noxious or deadly action upon insects.

NOTES AND QUERIES.

SLOW WORM.—Mr. E. D. Marquand in his interesting article on "The New Forest," mentions "a bright reddish-purple variety" of the slow worm. A few particulars respecting this variety as to its rarity or otherwise, whether found in any other locality, &c., would, I think, be interesting to other readers of SCIENCE-GOSSIP as well as for myself. No mention is made of it by Bell in his work on British reptiles. Has Mr. Marquand met with *Coluber* (or *Coronella*) *lævis?* I find the New Forest mentioned as one of its localities in the volume of SCIENCE-GOSSIP for 1872.—*W. G. Tuxford.*

CAT REARING A RAT.—Even a more extraordinary thing than a cat bringing up rabbits, is the following case of a cat taking care of a rat for a month, when the rat escaped. Last summer, a cat, a famous hunter, was kept in a grocer's shop in Helensburgh. She had a litter of kittens, of which three or four were drowned. A day or two after this the cat came upon a nest of young rats, six of which she killed, while she carried off two, and put them in a basket beside her remaining kittens. Her owner then put the kittens and rats in a long barrel to prevent their getting out. For a fortnight or so they all lived happily together, the rats getting no food, so they must have been suckled by the cat. One of the rats being a weakly one was overlaid. A shopman took the remaining rat out of the barrel when it ran away, but the cat found it, and took it back to the barrel. Getting annoyed by people who came to inspect the happy family, the cat

moved them all, rat included, to a corner of the shop, and a board was put up to keep them in. The rat several times tried to escape by either climbing over or making holes in the board. One night after it had been about a month under the care of its natural enemy, a piece of curtain having been left hanging over the board, the rat which had now grown pretty large escaped, and was never seen again. I pass through Helensburgh nearly every day, and saw the rat lying in the nest with the kittens.—*E. L. F.*

Under what Circumstances is the Yew Poisonous to Horses and Cows?—In my garden there are some yew-trees, planted forty or fifty years ago, which hang over a wall into an adjoining yard, where van-horses have constantly been in the habit of standing while the vans were loaded and unloaded, and I have never known any of the horses to have suffered. There is also in a park in this neighbourhood a long row of yew-trees exposed to the deer, cows, and horses, which graze there, but I have never heard of any harm having resulted. On the other hand, I understand that in a gentleman's grounds near here, two valuable cows last year got access to, and ate some cut branches of yew, and died in consequence; and I am told that in the case of a horse which died from eating yew, a *post mortem* examination shewed that death resulted from irritation of the intestines, caused by the sharp prickly points of the leaves, rather than from any poisonous property in their juices. I shall be much obliged by any information on the subject.—*T. H. G., Kettering.*

The Natterjack Toad.—I am glad to hear from Mr. J. Campbell in your issue of January, that the malodorous charge against our little friend, the natterjack, is a calumny. I was deterred from trying to obtain a specimen on account of what I had read. Mr. M. C. Cooke gives him a bad character in his book on "British Reptiles," and the late Mr. Harland Coultas in a work entitled "The Home Naturalist" says, "When pursued, the cross (or natterjack) toad draws itself together, so that the glands of its skin empty themselves, and its body becomes covered with a whitish moisture, giving out an intolerable stench which has been aptly compared to the smell of an old tobacco pipe; this is undoubtedly a means of defence with which the animal has been provided by the Creator." No wonder then after reading this description of the reptile, I did not attempt to obtain a specimen, but addressed a query to the editor, who transferred the question to the Notes and Queries column, where a reply appeared from Mr. W. R. Tate to the effect that the reptile gave off a strong sulphurous scent when frightened. Mr. Campbell's experience of the animal is still more favourable, which would lead one to suppose that some only are able to give off this smell, whilst others do not possess the power to do so. I beg to thank Mr. Tate and Mr. Campbell for their kindness in answering my question, and as the latter gentleman has actually kept the animal, he would greatly add to his kindness if he could give me some particulars with regard to its food, &c. As very little seems to be known about this species of toad, such information would, I think, be of general interest.—*J. Perrycap.*

Dogs affected by Sound of Music.—A black-and-tan terrier that we kept for some time was particularly sensitive to music. Although scales played on the piano made her yell piteously it was by the concertina's sweet influences that she was most affected, flying before it and if unable to leave the room, whining until the tune was stopped. A Spitzbergen dog-friend of ours is much excited by music, but when one tune is played its excitement is more marked—the tune is "Bonny Dundee." Dogs are not peculiar in their feeling for music, witness the fact that retired cavalry horses obey the call of the bugle when accidentally heard.—*C. J. W.*

Blackcap in December.—On December 17 last I was surprised and interested by seeing a blackcap busily engaged searching for insects among the bare branches of a vine trained against my house. There had been a hard, I should say unusually severe, frost for more than a week, and many even of our winter birds seemed to be pinched and sadly in want of food. The frost was then beginning to give, but I little expected to see so thoroughly a summer visitant able to endure such unusually wintry weather. I watched it for some minutes, and, as it was not three yards from my face, I had no doubt of its being a veritable blackcap. During the months of November and December last a hawfinch was seen nearly every day upon my lawn.—*H. M. M., Badgworth, Weston-super-Mare.*

Cornus sanguinea.—I think it is not unusual for this plant to flower in autumn. I noticed one of our hedges quite gay with its blossoms at that season in last year.—*J. M., New Brompton, Kent.*

Tea Stains.—Can you tell me why tea produces a blue stain when coming in contact with steel? A little black tea dropped from the tea-pot on a table-knife has this effect.—*R. H. N. B.*

Nuthatch.—I observed on Friday, March 28, a Nuthatch (*Sitta europæa*) on Barnes Common. Is this not rather a rare bird so near London?—*E. V. Seebohm, Nassau School, Barnes, S.W.*

Parrots and their Eggs.—The note in May number on this subject has attracted the attention of a gentleman resident in this neighbourhood, whose parrakeet has lately laid three eggs, with an interval of a day or two between each laying—the dates of the events being April 18, 21, 25, of this present year. Thinking that possibly some Manchester naturalists might be glad to see them, he has kindly placed them in my hands to show.—*E. Ward,* 29 *Burlington Street, Manchester.*

Intelligence of Animals.—A very worthy and candid old clergyman of my acquaintance used to tell the following story about some sagacious little dogs of his, in proof, as he was wont to admit, that "they knew, better than himself, how to observe Sunday." In the doctrine of his life he was in the habit of taking a constitutional ride daily; but on Sundays, when he went to perform the service in a neighbouring church, his little dogs, who were his faithful companions on the other days of the week, were not allowed to accompany him. On one special Sunday, having a clerical son staying with him, he gave himself a holiday, and instead of going to serve his church, indulged himself with his ordinary ride. No invitations, however, could persuade the little dogs to go with him. In vain he called; in vain he whistled. They would not break through their good habits, at the cost probably of some little self-denial, and in defiance of the lax example of their master.—*C. W. Bingham.*

Instinct or Reason.—I am not a little surprised that so many of your correspondents question the reasoning powers of animals, or treat as a moot point that on which nearly all the best authorities are agreed. In Professor Huxley's admirable little volume on Hume, recently published, we find the following: "We must admit that Hume does not express himself too strongly when he says, 'no truth appears to

me more evident than that the beasts are endowed with thought *and reason* as well as men. The arguments are in this case so obvious, that they never escape the most stupid and ignorant.' In fact this is one of the few cases in which the conviction which forces itself upon the stupid and the ignorant, is fortified by the reasonings of the intelligent, and has its foundation deepened by every increase of knowledge." (Huxley's "Hume," p. 104.) From the same volume I must quote another very amusing and suggestive passage. "One of the most curious peculiarities of the dog mind is its inherent snobbishness, shown by the regard paid to external respectability. The dog who barks furiously at a beggar will let a well-dressed man pass him without opposition. Has he not then a 'generic idea' of rags and dirt associated with the idea of aversion, and that of sleek broadcloth associated with the idea of liking?" (Ibid. p. 106.) Probably this trait of canine character has struck most persons who have any dog friends: it is very noticeable what an ineradicable hatred of uniforms dogs show, and very few postmen of any ength of service can be found who will not testify to the doggish detestation which is manifested towards them, however friendly their bearing. In this connection it is interesting to notice how Miss Cobbe finds elevation of character where Professor Huxley finds "snobbishness;" here is her verdict, "A clever dog is one of the best discriminators of character in the world. He distinguishes at a glance a tramp or swell-mobsman from a gentleman, even in the most soiled attire. He has also a keen sense of the relative importance of persons, and never fails to know who is the master of the house." ("False Beasts and True," p. 158.) Although, as all the world knows, Miss Cobbe is an ultra-enthusiastic pleader for the brute-world, the little work just quoted from affords a storehouse of arguments for the existence of reason in brutes; certainly it is hard to deny them this attribute when we even find them giving way to superstition. "Superstition, or the awe of the unknown, has been treated by some thinkers as the primary germ of religion, and by others, far more justly as its shadow. This shadow certainly falls on the dog no less than on man. The bravest dog will continually show signs of terror at the sight of an object which he does not understand, such as the skin of a dead animal, the snake of a hookah, a pair of bellows, or a rattle. That the brute fancies there is something *uncanny* and preternatural about such things, is apparent from his behaviour, which in a real case of danger is aggressively daring, and in that of imaginary peril abjectly timorous." (Ibid. p. 146.) Turn we to Mr. Darwin, his opinion is very clear, and will have with many the weight of a decision. "Of all the faculties of the human mind," he says, "it will, I presume, be admitted that *reason* stands at the summit. Only a few persons now dispute that animals possess some power of reasoning. Animals may constantly be seen to pause, deliberate, and resolve. It is a significant fact that the more the habits of any particular animal are studied by a naturalist, the more he attributes to reason, and the less to unlearnt instincts." ("Descent of Man," 2nd ed. p. 75.) Does not Mr. Wheatley hit on the true distinction between man and the brute-world, when he assigns it to language? And does not Mr. Gilliard venture on a very rash assertion when he says, "it is capable of proof that man cannot act at all intuitively?" It is well known that Professor Max. Müller has urged with his usual eloquence that language will yet prove the hard and fast barrier between spirit and matter, between man and brute; let us note then what he says on the almost settled case of Reason *versus* Instinct. "Some philosophers imagine they have explained everything if they ascribe to brutes instinct instead of intellect. But, if we take these two words in their usual acceptations, they surely do not exclude each other. There are instincts in man as well as in brutes. A child takes his mother's breast by instinct, the spider weaves his net by instinct; the bee builds her cell by instinct. . . . But what if we tear a spider's web and see the spider examining the mischief that is done, and either giving up his work in despair, or endeavouring to mend it as well as may be? Surely here we have the instinct of weaving controlled by observation, by comparison, by reflection, by judgment. Instinct, whether mechanical or moral, is more prominent in brutes than in man, but it exists in both, as much as intellect is shared by both." ("Lectures on the Science of Language," 9th ed. vol. i. p. 402.) Perhaps the latest and most startling theory, stated with a grotesque naïveté which has a bewildering charm, is that of Mr. Samuel Butler, who, in his powerful book called "Life and Habit," boldly says that "instinct is inherited memory." It is unfair to tear from the texture of his ingenious argument and elaborate illustration isolated passages, but the following samples will perhaps whet the appetites of those interested in the subject. Touching on the inveteracy of habit, and the difficulty of breaking away from "The grey nurses Use and Wont," he says, "In our own case, the habit of breathing like a fish through gills may serve as an example. We have now left off this habit, yet we did it formerly, for so many generations, that we still do it a little, it still crosses our embryological existence like a faint memory or dream, for not easily is an inveterate habit broken." ("Life and Habit," p. 70.) Again, "The action of embryo making its way up in the world from a simple cell to a baby, developing for itself eyes, ears, hands, and feet while yet unborn, proves to be exactly of one and the same kind as that of a man of fifty who goes into the city and tells his broker to buy him so many Great Northern A shares." And this, "The duckling hatched by the hen makes straight for water. In what conceivable way can we account for this, except on the supposition that the duckling knows perfectly well what it can and what it cannot do with water, owing to its recollection of what it did when it was still one individuality with its parents, and hence when it was a duckling before." Taking such passages as this by themselves we might be tempted to doubt with the "Saturday Review," whether Mr. Butler was not palming off a big joke on the public, but carefully read, the impression is more likely to be that of Mr. Wallace, and this distinguished naturalist sees in "Life and Habit" much sound speculation and vital truth.—*James Hooper*, *Denmark Hill*, *S.E.*

INTELLIGENCE IN ANIMALS.—"It is quite clear" (says Dr. Whately) "that if such acts were done by man they would be regarded as an exercise of reason, and I do not know why, when performed by brutes, evidently by a similar process, *so far as can be judged*, they should not bear the same name. To talk of a cat's having instinct to pull a bell when desirous of going out at the door . . . . would be to use words at random." And I think many would agree with the learned archbishop if they would carefully consider the testimonies and researches of such eminent naturalists and thinkers as Locke, the philosopher, Bacon and Burns, Professors Darwin, Huber, Brehm, Rengger, Kirby and Lord, F.Z.S., Rev. F .O. Morris, Lubbock, and the lately recognised genius Edward, of Banff, &c. As an example, of which so many can

be adduced, let us take an incident related by Mr. Edward: he saw two birds vainly trying to turn over a large fish on the sands to get the vermin beneath; after many futile attempts, extending over half an hour or more, and after attracting a third bird who helped them to no purpose, they stood together and apparently by their noise were engaged in some mysterious process of conversation and reasoning, they again set to work eagerly, and dug a hole in the sands from one side of the fish, even to undermining a certain distance, and then, with evident expressions of triumph, rolled it over with ease, and commenced the feast they had worked for. That fish measured $3\frac{1}{2}$ feet, being a fine cod, and those birds undoubtedly used their reason to elaborate a scheme to accomplish their object. Without running off into Darwinian theories, I would remind Dr. Keegan, seeing he lays so much stress on the *capacity* of the brain, that one of our great physiologists tells us—"That every chief fissure and fold of the brain of man has its analogy in that of the ourang:" and Huxley adds, "Whilst in those things in which the brains of men and apes do differ, there is also a great difference among various men." It is true structure is not all—the machinery may be perfect in every detail, yet, if it lack the motive power, of what avail is it? Still, is it not reasonable to suppose that structure being so similar, God intended the ape to use his brain like man's, but in a less degree? The chief obstacle to belief in the reasoning power of animals lies in the fear of what the admission may lead to, but surely we need not grudge to these poor brutes the possession of a feeble development of reason, when man, and man alone, can thank his Creator for giving him a hope of a future which no animal seems destined to enjoy.—*John H. Wilson.*

INTELLIGENCE IN ANIMALS.—I heard a singular story of a Skye terrier, which was told me by a lady-friend who knows the dog well; it was a great pet with its master. On one occasion its master brought home a puppy of another breed. On its introduction into the house, the Skye terrier appeared to take no notice of it whatever. After a few days the puppy could nowhere be found, and on making inquiry, the gardener said he remembered seeing the Skye terrier smoothing some earth down on the top of a rubbish heap in the garden, and on examining the said heap, the body of the puppy was found buried some depth. The Skye terrier, being jealous of the notice the puppy received from its master, had enticed the puppy to the heap, killed and then buried it.—*Edmund Durrant.*

SAGACITY OF A TREE-CREEPER.—Anecdotes tending to show some sort of reasoning power in the more sagacious quadrupeds are not uncommon, but the following having reference to that diminutive bird the common creeper (*Certhia familiaris*) is interesting as proving these faculties to be possessed by others than dogs, horses, and animals of comparatively complicated brain-structure. Within the last few days we have seen the nest of one of these creatures very snugly placed within a hole in a wall caused by the removal of an entire brick, the breach being partially and to all appearance almost entirely filled up by a portion of the same placed loosely in front. As the movements of the small parents were a source of interest to the proprietor, the loose piece had frequently been removed, and the privacy of the hen bird had been invaded by more than one pair of curious eyes, until she was so far familiarised to the intrusion as to remain undisturbed on her eggs while under inspection. Her mate, however, does not seem to have shared her confidence and determined to put an end, if possible, to these unwelcome visits. He would fasten the half brick as other bricks were fastened, and, failing mortar, placed in the crack as much well-kneaded clay as he could accumulate. This is the more remarkable as the bird uses no cement of any kind in making its nest. The work though small in extent was as well executed as though a swallow had been the engineer. But alas! it was easily broken by human hands, and the work of the architect must be recommenced. I grieve to add that, after a second earthwork had in like manner been constructed, the ingenuity and perseverance of the bird could no longer be tried, for at this stage some unknown person robbed the birds of the eggs. *J. J. Plummer.*

CAN WORMS CRAWL BACKWARDS?—My attention having been drawn to this subject by a note in the May number of this valuable magazine, I have experimented with the result that they *can* crawl backwards, though very reluctantly. When experimenting, I tried to make a worm crawl along a narrow path, and every time it turned its head from the straight course, I gave it a gentle reminder on the head with a piece of stick. After sundry knocks, it came to the wise conclusion that it would rather crawl backwards than be hit in this way. It then crawled backwards about three feet. I have experimented on other worms, and in different ways, always with the same result, viz.: that they *can* crawl backwards.—*Percy A. Ramage, Stoneclough, near Manchester.*

SNAKES.—I caught an ordinary brown snake in Epping Forest lately, and as it was rather longer than ordinary (2 feet 6 inches) I determined to stuff it. As I could not get any ordinary naturalist to undertake it (!) I did it myself. After skinning it, I threw the skin into some hot water with some washing soda in it to get off some of the fat adhering to it; immediately it was immersed, all the brown scales changed to a bright light blue and the darker shades to a beautiful black. How is this to be accounted for? It was not the new skin, but a perfect change of colour.—*J. D. Hardy, Clapton.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

G. H. STEWARD.—You will find an outline of all the great changes which our planet has experienced, physical and vital, in Taylor's "Geological Stories," 4th edition, published by Hardwicke & Bogue, 192 Piccadilly, W., price 4*s*.

J. C. GLOUGH.—Your plant is the beautiful Water avens (*Geum rivale*).

J. W. AND OTHERS.—Egg-drills, &c., may be procured of Mr. R. B. Spalding, 46 High Street, Notting Hill, London, W.

R. T. LEWIS.—Many thanks for your generous and prompt answers.

L. HAWKINS.—We are always willing to assist students in naming specimens, and it is a genuine pleasure to do so. The remarks made were those of the gentleman to whom your specimens were forwarded.

W. A. Firth.—Your seaweed is *Ptilota plumosa*.

F. H. Arnold.—We do not think it "hopeless" to secure you the sedges you require.

To Botanical Exchange Club Members.—The former list of desiderata will remain open for the present year.

W. M. H.—The "knots" in the straw of wheat are the solid *nodes* which are common to all the grass family throughout the world.

E. Pritchard.—Dr. Carpenter's "Animal Physiology" (last edition); Huxley & Martin's "Text-Book of Physiology;" Dr. Nicholson's "Manual of Zoology;" Huxley's "Lessons in Elementary Physiology," and Wilson's "Zoology" (published by Chambers) are all good books for the object you seek.

H. R. Moiser.—The list of desiderata for the Botanical Exchange Club has not been sent out this year, as it was thought that of last summer might stand.

T. W. Harris.—Your shells are *Clausilia rugosa*. Get Tate's "British Mollusks," coloured illustrations, price 6*s*. London: Hardwicke & Bogue.

J. Elkington.—The specimens are (1) the round sea-urchin (*Echinus sphæra*), and (2) the purple-tipped sea-urchin (*Echinus miliaris*).

P. R. V.—Your flower is *Fritillaria meleagris*.

J. J. T.—The only place where coralline crag fossils can be obtained is Orford in Suffolk.

R. Brown.—Get Dr. Cooke's "Microscopic Fungi," published by Hardwicke & Bogue, with coloured plates, &c., at 6*s*.

W. B. Scott (Chudleigh).—Wishes some reader of Science-Gossip to send him specimens of the natterjack toad and the crested newt (*Triton cristatus*).

B. M. W.—Your specimen is not a lichen, but the mycelia of a fungus which is common on the walls of wine-cellars.

Mrs. Edwards and Rev. C. F. W. T. Williams.—Accept our best thanks for the botanical specimens forwarded to us.

Mr. J. G. Osborne, who is engaged in some observations on the development of the embryo in invertebrate ova, wishes to know of some preparation which would render the structures more transparent, and arrest and preserve them at different stages (see article in our March number on "Preserving delicate Organisms," and paragraph in this number under head of "Microscopy").

EXCHANGES.

Wanted, unset specimens of British Spiculiferous Hymenoptera, especially the Chalcididæ. Well-mounted slides of vegetable tissues stained in two colours, offered in exchange.—Charles Vance Smith, Carmarthen.

For specimen of *Peridermium Pini* (rare in England), send stamped addressed envelope and object of interest to Charles F. W. T. Williams, 4 Darlington Place, Bathwick Hill, Bath.

Fine American Lower Silurian and Devonian fossils, in exchange for British Mesozoic fossils.—A. B. Baker, 2 College Ave, Rochester, New York, U.S.A.

The "Dictionary of Mechanics" (E. H. Knight), 29 numbers to date, offered in exchange for 1874, 1875, and 1876 of Science-Gossip, or work on natural history.—R. L. Hawkins, Hastings.

Liberal exchange in first-class objects, offered for a pure gathering of *Volvox globator*. Communicate before sending.—E. Wheeler, 48 Tollington Road, Holloway, N.

Wanted, freshly-collected insects for microscopic purposes, in exchange for unmounted objects, curiosities, &c.; four varieties, Japanese cloth, for one well-mounted slide, curious structure.—Tylar, 165 Well Street, Birmingham.

Wanted, Turton's "Linnæus," vol. i. 1806.—W. E. Milner, 47 Park Road, Haverstock Hill, N.W.

Duplicate eggs of capercaille, common sandpiper, common snipe, blue-tailed godwit, spoonbill, heron, little bittern, moorhen, coot sheldrake, razor-bill, guillemot, and black-headed gull, all side-blown. List of what is required in exchange, will be sent on application to R. Davenport, 124 Georgiana Street, Bury, Lancashire.

For micro slides, saloon pistol, by Hollis & Sons, with ammunition, new in February.—J. G. Johnson, 93 St. James' Street, Newport, Isle of Wight.

British Shells. Duplicates for exchanged. List sent on application to J. W. Cundall, Carrville, Alexandra Park, Redland, Bristol.

Wanted, Sciopticon, or other good form of lantern, also Darwin's "Insectivorous Plants," loan or otherwise. Have many things to offer, such as micro slides, first-class, unmounted prepared material, mostly marine organisms in great variety. Marine algæ for balsam or herbarium specimens, living plants, alpines, ferns, Drosera, &c. State wants; will take cash or other exchanges.—T. McGann, Burren, Ireland.

Wanted, Devonian corals, named or unnamed. Fossils from other formations given in exchange.—William Quarterman, 2 King Street, Borough, S.E.

Splendid specimens of Marcasite var, cockscomb, for other minerals (cabinet specimens) or fossils. A few fine large specimens of flexible corals (*Pterogorgonia pinnata*). Want fossils or minerals.—J. McKenzie, Nursery Cottage, Berkby, Huddersfield.

For well-mounted slide, I will send diatomaceous mud from peat, very rich.—W. Sim, Gourdas, Fyvie, N.B.

Live moles wanted.—J. E. Palmer, 35 James Street, Dublin.

Good specimens (side blown) of the following eggs, in exchange for other good eggs or Lepidoptera. Eider duck, guillemot, lesser B. B. gull, herring gull, cormorant and sandwich, Arctic and common tern.—Adamson Rhagg, 21 Grainger Street, Newcastle-upon-Tyne.

Pollen of *Calla Æthiopica, Amaryllis*, &c., mounted in balsam. Also several hundred silkworms (*B. mori*), to exchange for algæ, herbarium, zoophyte, shells, or any unmounted objects of interest.—Mrs. Skilton, 21 London Road, Brentford, Middlesex.

Morris' "British Birds," and "Nests and Eggs," wanted in numbers. Books or cash in exchange.—G., 44 Hillmarten Road, Holloway, N.

For specimen of *C. hastata* (Australian zoophyte) for mounting, send well-mounted slide. Having means of sending parcels to, and receiving from, foreign countries *free of charge*, I am anxious for foreign correspondence.—B. B. Scott, 24 Seldon Street, Kensington, Liverpool.

Very fine slides of anchors, and plates of *Synaptæ Gallienica*, selected and arranged in various symmetrical patterns, likewise a few diatom slides arranged in different designs, in exchange for really good unmounted microscopic material. Would like to correspond with some microscopist in the locality of Torquay, with a view to mutual exchanges.—W. White, 18 Convent Street, Nottingham.

Nicely-finished slide of *Acilius sulcatus*, dissected (several pieces under cover) offered for first-class slide of picked diatoms, or rock sections.—J. Neville, Wellington Road, Houndsworth, Birmingham.

Part of a jaw of an Ichthyosaurus from Lyme Regis. Will take exchange in fossils. Write for particulars.—W. T. Ord, 13 Royal Park, Clifton, Bristol.

For *Æcidium tragopogonis* (goats' beard cluster cap), send stamped envelope to T. Brittam, 52 Park Street, Green Heys, Manchester. No exchange required.

Well-mounted slides, good unmounted material, and British shells, offered in exchange for shells, British and foreign, and books (on plants and natural history subjects preferred).—E. R. F., 82 Abbey Street, Faversham.

British Birds' Eggs.—Guillemot, razor-bill, kittiwake, oyster-catcher, redshank, carrion crow, magpie, red-backed shrike, &c., to exchange for owl, plover, tern, woodpecker, or any not in collection. Only side-blown eggs required. Lists to J. Wrangham, 93 Tyrwhitt Road, New Cross, London, S.E.

BOOKS, ETC., RECEIVED.

"Outlines of Field Geology." By Professor Geikie. London: Macmillan.

"Practical Photography." By O. E. Wheeler. London: Bazaar Office.

"Greenhouse Flowers." Part i.

"Il Principio della Sapienza," per A. P. Mauro. Naples.

"Proceedings of Academy of Natural Sciences." Philadelphia.

"New Remedies," 3 and 4, vol. viii. New York.

"Science News." New York.

"Feuille des Jeunes Naturalistes."

"Bulletin de la Société Belge de Micrographie."

"Journal of Forestry." No. 26.

"American Naturalist." June.

"Canadian Entomologist." June.

"Land and Water." June.

Natural History Rambles.

"Lane and Field." By the Rev. J. G. Wood, M.A.

"The Woodlands." By M. C. Cooke, M.A., LL.D.

"Lakes and Rivers." By. C. O. Groom Napier, F.G.S.

"Mountain and Moor." By J. E. Taylor, Esq., F.L.S., F.G.S., Editor of Science-Gossip.

"Underground." By J. E. Taylor, Esq., F.L.S., F.G.S., Editor of Science-Gossip.

"The Sea-shore." By Professor P. Martin Duncan, M.B. (London), F.R.S.

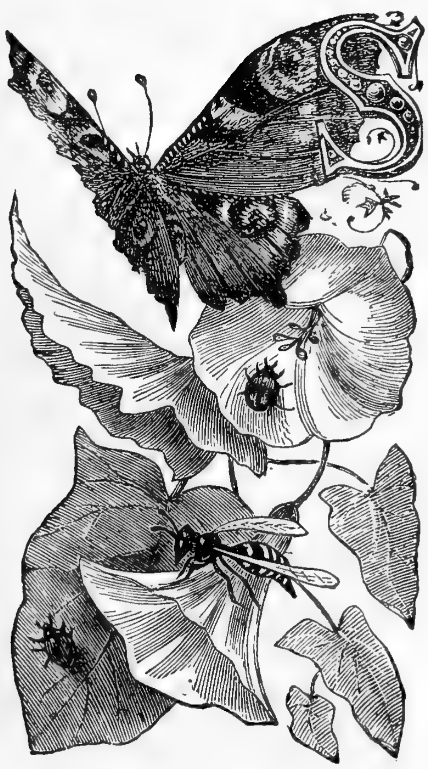
Society for Promoting Christian Knowledge 77 Great Queen Street, London.

&c. &c. &c.

Communications received up to 10th ult. from:—T. W. D.—G. C. D.—E. E. E.—J. W., jun.—J. O. B.—Dr. P. Q. K.—F. I. G.—J. H. W.—W. L.—J. D.—W. R.—J. H.—W. T.—A. C.—E. D.—C. R. S.—F. W. R.—G. H. S.—C. B.—E. W.—J. G. B.—J. G. D.—A. B. B.—H. R. M.—G. C.—J. W. T.—Dr. J. A. O.—P. A. R.—E. M.—W. B. S.—A. J. R.—I. C. T.—R. L. H.—H. M.—J. J. P.—W. W.—J. H. A. J.—A. W.—E. V. S.—J. D. H.—F. W. I.—W. M. T.—J. C. C.—G. D. S.—J. W.—T. B.—J. H.—A. H. H.—W. E. M.—R. T. L.—J. R. H.—A. T.—S. B.—J. G. J.—R. S. G.—R. D.—M. H. R.—A. W.—H. D. B.—T. McG.—J. W. C.—G. O. H.—R. L. H.—L. C.—W. A. F.—J. N.—W. T. O.—W. W.—W. H. G.—B. B. S.—W. S.—B. M. W.—W. W. T.—M. S.—A. R.—G. S. D.—J. M. W.—J. E. P.—J. S.—J. McK.—J. W. S.—W. Q.—T. B.—F. H. A.—Dr. M.—W. B.—E. P.—K. M. J.—E. R. F.—J. C., jun.—F. W. H.—&c.

THE GEOLOGY OF SHEFFIELD.

By T. V. HOLMES, F.G.S., H.M.'s Geological Survey.



SHEFFIELD is selected this year as the meeting-place of the British Association, and as geological excursions always form one of the pleasantest parts of the Association's programme to the majority of members, the following notes on the geology of the district may possibly be of service.

It is true that the recently-published Memoir of the Geological Survey on the Yorkshire coalfield leaves little to be desired by the mining engineer or colliery proprietor, to whom full and accurate information on all points connected with the coalfield is the one thing needed. But its size and price must ever deter persons simply desirous of making the most of their week at Sheffield with the British Association from attempting to acquire information from such a source. In addition, the geology of the Ordnance quarter sheet (82 N.W.) in which Sheffield stands, is not explained in a brief memoir of thirty or forty pages, on account of the Derbyshire part of it not having yet been mapped by the Ordnance Survey on the scale of six inches to a mile.

A glance at a general geological map of England and Wales, such as that of Professor Ramsay, shows Sheffield standing not far from the centre of the great Yorkshire and Derbyshire coalfield. This coalfield, measured along a line ranging north and south from a point about ten miles west of Nottingham to the eastern suburbs of Leeds, is about sixty-five miles in length. Its breadth at the northern end, immediately south of Leeds and Bradford, is twenty-one or twenty-two miles. It gradually narrows southward, being at Sheffield about thirteen miles wide (due east and west), and varying in Derbyshire from seven to ten miles. On its eastern margin it is overlaid unconformably by the magnesian limestone (Permian). On the west the coal measures rest on the series of thick coarse sandstone with interbedded shales, and occasionally a thin coal, known collectively as millstone grit. This millstone grit forms the high bare moorland which, from the Peak of Derbyshire northward, divides the coalfields of Yorkshire and Lancashire. South of the Peak the underlying Yoredale beds and carboniferous limestone are exposed, but too far from Sheffield to come within the scope of this paper. The five great sandstones of the millstone grit hereabouts are: the first (or highest) grit, or rough rock; the second, third, fourth, and fifth grits; the two last being also called the upper and lower Kinderscout grits. The coal measures are divided into the lower coal measures, or beds below the Silkstone coal, and the middle coal measures, which include almost all the coals of any importance. In addition may be mentioned the only rocks classed as upper coal measures, the red beds with coal plants seen at Conisborough Pottery. Most of the upper coal measures were removed from the coalfield by denudation, previous to the unconformable deposition of the magnesian limestone above the carboniferous strata.

The lower coal measures are more remarkable for massive sandstones forming well-marked escarpments than for coals. Few of the coals are of more than local importance. The Ganister and Whinmoor coals are the only ones of this series worthy of notice about Sheffield. In the middle coal measures the Silkstone coal, the lowest of the important beds, is perhaps the first in point of reputation, the Barnsley coal being held in little less esteem. Other coals exist, between these two and above the Barnsley, of fair thickness and quality, but they are not worked in this locality, from their inability to compete with the Silkstone and Barnsley seams, which have no rivals

about Sheffield and Barnsley. Coals with other names, and on different horizons, are worked about Wakefield and Leeds, Halifax and Bradford.

Then, above these measures rich in coal, we have, towards the upper or eastern boundary of the coalfield, a series of measures with few coals and few thick or massive sandstones. The escarpments made by the sandstones in this part of the coal measures are, consequently, usually feeble and indefinite, giving rise to a slightly undulating country in which no beds are traceable for more than a short distance. Two rocks, however, are not without a perceptible influence on the landscape east of Sheffield, and are also largely quarried. These are the Wickersley Rock, much used for grindstones, and the red rock of Rotherham. The last is a sandstone of Carboniferous, and not, as used to be supposed, of Permian age, which rests unconformably on the beds below, and is altogether perhaps the most singular geological phenomenon in the district. A more detailed account will shortly be given of it.

The lowest beds of the district, the millstone grit, may easily be reached from Sheffield, as the lower coal measure belt of country is much narrower than usual due west of that town. Leaving Sheffield in a westerly direction by the Glossop road, the outcrop of the Silkstone coal is passed near the spot at which Gell Street crosses, and we are on lower coal measures. A gradual ascent in the same direction brings us to Stephen Hill, near which the fault, ranging north-east and south-west, crosses the road, which here divides the lower coal measures from the millstone grit. The road hitherto has been a gradual ascent, and is here about 774 feet above the level of the sea, the height of the alluvial flat of the Don at the Wicker being 150 feet. Hence a gentle descent of half a mile brings us to the edge of the Rivelin valley, and the brow of the fine escarpment of the Third Grit, which here is conspicuous on both sides of the valley, and which, though west of Bell Hagg, and a corresponding point on the north side, has its base 200 or 300 feet above the stream, soon descends to its level eastward at Little London Wheel. The nature of this coarse, massive grit and conglomerate is shown in Bell Hagg quarry. The view from this point is very wild and romantic. Few spots, if any, excel the Rivelin valley as an example of the influence of subaerial denudation in the erosion of river valleys, as we now see them, and the production of escarpments. I may here also remark, by the way, that few influences are likely to be more efficient in removing any notion that may linger in the mind as to the influence of faults in the production of river valleys than an inspection of the Geological Survey maps of coal measure districts, especially those of six inches to a mile. Of course, I do not mean that it will be found that faults never coincide with river valleys, but that they show no preference for them, and that the number of faults ranging along them is not, on the average, greater than in other parts of the map.

The millstone grit is, about Sheffield, generally divided from the lower coal measures by faults. These lower coal measures are somewhat intermediate in character between the millstone grit and the middle coal measures. South of the Don and west of the Sheaf, the middle coal measures occupy less than a square mile of ground, this being the area between the Don, Sheaf, and Porter Brook, on which the chief business streets and buildings are situated. The lower coal measures occupy all the ground around the above area. On the south, west of Norfolk Park, about Heeley and Bannercross; west, about Crookes and Crookes Moor, and, crossing the Don, a large area west of Pitsmoor is all lower coal measure ground. A short distance south-west of Sheffield, and north-east of Ecclesall Bierlow, may be seen the fine escarpment of Brincliffe Edge, the most striking of those of the lower coal measures in the immediate vicinity of Sheffield. Parallel to it, but nearer Sheffield, and consequently above it, is a sandstone, the escarpment of which, though clearly defined, is comparatively feeble. These two rocks are worth noting here, as they are the representatives of the two most important and persistent sandstones of the lower coal measures. The Brincliffe Edge sandstone is known, north-west of Sheffield, as the Greenmoor Rock, and further north, again, as the Elland Flagstone. It is compact and fine-grained. The uppermost of the two sandstones (which forms Machon Bank) is known north-west of Sheffield as the Grenoside Rock. It is a rough gritty stone, and though not so persistent as the Greenmoor Rock, makes a much bolder escarpment, and covers much more ground, about Grenoside and Wortley. East of the Sheaf at Heeley it rapidly dies away. The variations in the relative preponderance of these two rocks in the landscape, and in the heights of the bases of their escarpments are very remarkable.

North-west of Sheffield few excursions will repay the lover of geology and scenery better than one to Wharncliffe Crags. These crags are the escarpment of a rock of lower coal measure age lying below the Greenmoor and Grenoside rocks, which are a few hundred yards east of it, and may be seen at the same time. Unlike them, however, the Wharncliffe rock sinks into insignificance a very short distance north and south of the crags, though at the crags it is a hard, massive, thick-bedded sandstone. The view westward from near Wharncliffe Lodge is very fine, and will not readily be forgotten. The Don runs several hundred feet below, but its course is almost invisible on account of the mass of verdure which fills the river valley as high as the foot of the crags, and contrasts with the high bare moorland beyond. It is also worth while to take a short walk eastward from the crags, and, crossing the Greenmoor Rock, here insignificant in appearance compared with the

Grenoside beyond, to enjoy the view from the crest of the Grenoside escarpment over the rich but flatter country on the east towards Rotherham.

Though at Wharncliffe Crags we are at the abode of the "Dragon of Wantley," the tale of whose destruction by More of More Hall, is familiar to readers of Percy's "Reliques," the geologically instructed visitor will not expect to find a magnificent cavern in the sandstone at the spot where the words "Dragon's Den" appear on the map. All that exists is an open joint in the crag, large enough for the accommodation of a serpent, but not for that of an animal of any size provided with legs. The line of the ballad describing the locality

"In Yorkshire, near fair Rotherham,"

gives us a glimpse of the relative importance of Sheffield and Rotherham at the time it was written, the distance of the "Dragon's Den" from Rotherham being rather greater than that from Sheffield; it is the more noticeable as Sheffield was then, as now, a seat of the hardware manufacture:

"But first he went, new armour to
Bespeak at Sheffield town."

No other lower coal measure rocks deserve notice in a sketch like this; it will therefore be best now to proceed to consider the middle coal measures.

A glance at the map (one inch) of the Geological Survey (82 N. W.) shows the strike (that is the direction of the lines of outcrop) of the middle coal measures, south of Sheffield, to be from north-west to south-east. But from Sheffield northward two great faults, throwing down the measures between them, alter the strike of the beds so much that their outcrops are at right angles to their direction immediately south of Sheffield, viz. south-west and north-east, which is also the direction of the lines of fault. These two faults are known as the northerly and southerly Don faults. The northerly fault ranges from half to two-thirds of a mile west of the alluvium of the Don. The southerly fault is, roughly speaking, parallel to the northerly fault, and for some distance keeps on or close to the river and its alluvial flats. The Silkstone and Parkgate coals recover their former line of strike about three miles north of Sheffield, but some of the higher beds retain the strike induced by the faults for a much greater distance. The Parkgate coal lately mentioned is the first coal of any importance met with above the Silkstone, which is about 300 feet below it. The Silkstone and Parkgate rocks, which overlie the coals so named, form, with the measures between them, the steep hillside east of the Sheaf, on top of which St. John's church stands, and may be traced in a south-easterly direction, towards Norfolk Park and Intake. From the top of this hillside, which is capped by the Parkgate rock, a fine view may be had both eastward and westward. From this point there is a gradual decrease, on the whole, in the average height of the sandstone ridges eastward, which continues till the magnesian limestone escarpment bounding the coalfield is reached. The red rock of Rotherham, however, imparts a more than average height to the strip of ground covered by it, and forms a more or less picturesque ingredient in the landscape, though it never attains a height that would be thought considerable in the lower coal measures.

To reach the red rock from Sheffield it will be necessary to cross the outcrops of all the more important coals lying above the Silkstone, among which may be mentioned, in ascending order, the Swallow Wood, Barnsley, and High Hazles coals, whose outcrops range north-west and south-east, in the tract of country between the Parkgate rock and the Rother.

The red rock, as already mentioned, rests unconformably on the beds below, and is distinguished also from almost all other coal measure sandstones by its red or reddish colour. The only other exceptions to the uniformly buff, or whitish-brown tint of carboniferous sandstones, are found in a rock lying above the Wickersley Rock, in the neighbourhood of Brampton-en-le-Morthen, and in the Wickersley sandstone in Ravensfield Park. The Brampton Rock may be seen at Sawn Moors and Pickles quarries. This red colour has never, I believe, been seen except, as in these cases, in rocks high up in the series.

The red rock covers a strip of country of very variable width, though seldom more than a mile, between Rotherham and Harthill, south of Kiveton Park railway station. It is sometimes found in two beds, sometimes as one mass of sandstone. In the excavations made for the Rotherham water-works, near Ulley, irregular bands of red and purple shales were seen interstratified with it. Its total thickness must vary exceedingly. Its carboniferous age is shown in the cutting on the Midland railway, between Masborough and Eckington, about one and a half miles south of the former place. There a coal five inches thick, lying on twelve feet of sandstone of the ordinary coal measure type is seen resting on the red rock; while, on the other hand, near Harthill, the Permian beds are seen lying unconformably above it. At Whiston a coal underlies the red rock, which is in all probability the Herringthorpe coal. But a mile north of Whiston the red rock, in two beds, is seen, judging from the dip, to underlie the Herringthorpe coal. The probable explanation of this anomaly is given in the "Memoir" on the Yorkshire coalfield before alluded to. The red rock may "abut underground against the slope of a denuded hollow," about Herringthorpe. At Whiston, however, "the bottom of the trough is at a higher level than to the north of Herringthorpe, and the red rock is above the coal." At Aston the rock on which Treeton stands, and which may be called the Treeton rock, abuts against the red rock, having been gradually approaching it between Treeton and Aston.

The general conclusion to which we are led by the above facts, and others which might be adduced, is

that the Red Rock fills up a great hollow excavated by denudation; this hollow having a very variable and uneven bottom, and that it lies high in the coal measures, and is unconformable to the rocks below and above it. The Whitehaven sandstone of the Cumberland coalfield occupies probably an analogous position in its locality, and is also, compared with the other carboniferous sandstones about Whitehaven, a red or reddish rock.

The red rock may be visited profitably either about Rotherham or at its southern end, near Kiveton Park railway station, at Harthill. From Kiveton Park station, the villages of north and south Anston with their magnesian limestone quarries, which supplied the stone for the Houses of Parliament and the Jermyn Street Museum, may be easily visited. North of North Anston the spire of Laughton-en-le-Morthen is conspicuous on an outlier of magnesian limestone. A mile north-east of Laughton brings us to the junction of the two beautiful glens at which the remains of Roche Abbey appear. Here two little streams unite and traverse the magnesian limestone escarpment. For the rivers in this part of Yorkshire, the Don, Went, Aire, and Wharfe, all show that apparent fondness for crossing escarpments characteristic of the streams taking their rise in the Wealden area, and doubtless their course has been similarly influenced.

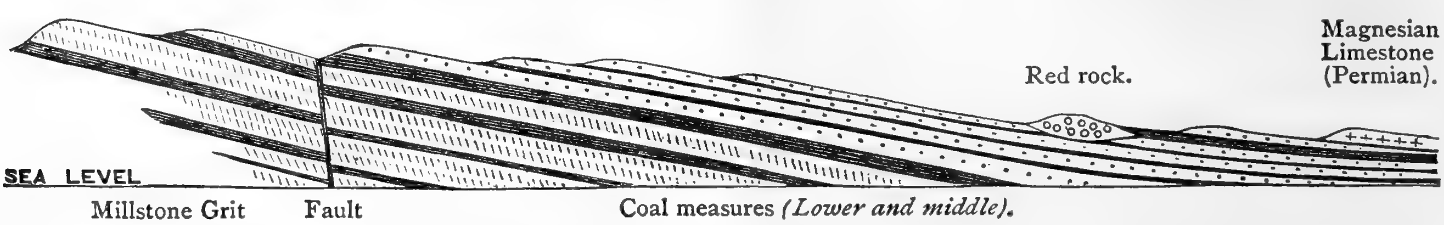
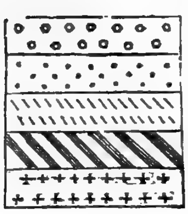


Fig. 135.—Section from a point a little west of Sheffield to the magnesian limestone escarpment.



Red rock.
Ordinary coal measures.
Millstone grit.
Shales.
Magnesian limestone.

On approaching Rotherham, the visitor will not fail to notice the tree-clad hill at, and southward of, the town. It is crowned by red rock. The places near at which it may be profitably studied have been already mentioned. Continuing our journey towards Conisborough for the purpose of inspecting the upper coal measure plant beds, we again find ourselves close to the magnesian limestone escarpment, which is well seen for some miles at Conisborough, on the right hand, looking northward, and forms a part of one of the most beautiful views in the district. Besides a sight of the magnesian limestone *in situ* we have here a remarkable instance of its excellence as a building stone under favourable conditions. The venerable keep of Conisborough Castle, which is built of it, and is now about 800 years old, looks almost as fresh now—so far as absence of decay in the stone is concerned—as it did when first erected. How much of this result is due to purity of air, and how much to careful selection of the stone, can hardly be ascertained by us now.

South of Sheffield, the Midland Railway cuttings, both north and south of Dronfield, showed some very interesting coal measure sections ten years ago, when the line was first opened, and I had the advantage of visiting them while new, in the company of Professor A. H. Green. Should any railway-cutting excursion be practicable, those about Dronfield seem to me to deserve the first choice, though there is no want of interesting sections in the railways on other sides of the town.

Once, some years ago, while waiting in a train outside the M. S. and L. railway station, and above the broad street called the Wicker, a fellow-passenger remarked, as he gazed down upon the street, "That would be a fine street if there were any fine buildings in it"—an odd though true remark. A somewhat similar reflection will probably pass through the mind of almost every person who visits Sheffield for the first time; he will think, "This would be a very fine town if there were any fine buildings in it." For the natural picturesqueness of the site of Sheffield is very great—second only perhaps to that of Edinburgh among British towns. Unfortunately its smokiness, the meanness of its public buildings, and indeed of the whole business part of the town, are still more difficult to parallel. The suburbs, however, are extremely pleasant, especially those to the west and south-west, and afford an abundance of fine prospects. A good view of the busy part of the town may be obtained from the neighbourhood of the M. S. and L. Station, looking, of course, southward. On the right is seen the main part of the town surrounding the old parish church, and standing mainly on the Silkstone rock which overlies the Silkstone coal. Farther westward, towards Crookes, are the lower coal measures, which at Crookes attain a height of about 800 feet above the sea, or about 650 feet above the alluvial flats of the Don and Sheaf. Looking, as we do, on the dip slopes of the various beds (the dip being from Crookes to the Sheaf) the fall is gradual and gentle. East of the Sheaf, however, we look not on a dip slope but on the escarpments made by the outcrops of the Silkstone and Parkgate rock, with the measures between them. Hence the contrast which must strike every visitor to Sheffield who sees it from this point of view, between the steepness of the eastern, and the easy slope of the western hillside.

BOTANICAL WORK FOR AUGUST.

UNNOTICED DIFFERENCES IN OUR COMMON PLANTS.

WITH the exception of chickweed, we have few plants so common as the groundsel (*Senecio*) and the dandelion (*Taraxacum*). These are our favourites, at least favourites for all bird fanciers, for they can be met with at every season of the year, but, like most other things which are of frequent occurrence, they are liable to be overlooked by the busy student. Let us, however, bestow a passing thought on these universal species; they assume so many forms and shapes as sometimes to be unrecognisable, except to the prying botanist who has often cast a scrutinising glance upon them.

Common groundsel (*Senecio vulgaris* (L.). We think it not needful to enter into a full description of this well-known species. Many of our readers must have noticed several well-marked forms; it is to these we wish to direct attention.

The type "*vulgaris—proper*," is about 1 foot high, often much branched, with pinnatifid, coarsely-toothed, and succulent leaves.

Sir J. E. Smith describes a species, *S. lividus*, as closely allied to another species, *S. sylvaticus* (Linn.). This, however, never has auricles with the leaves; our first variation from the above type should bear this name:

Var. 1. *Senecio lividus* (Sm.). A much smaller plant than the type, with slender stem, and narrow leaves; very often the flowers are solitary, although we commonly find it with about five.

2. *S. vulgaris* (var. ψ). This is a remarkable plant, which appears to have escaped the attention of the authors of our "Floras." The leaves are all entire, lanceolate and with linear auricles. The plant has the resemblance of *S. sylvaticus* at a distance. It occurs near Penrith, also in several places along the banks of the river Eden.

3. *S. vulgaris* (var. β). A very luxuriant form of the groundsel, occurs on rich loamy soils; the leaves are broad, dark green, sometimes almost pinnate; we however, believe this is not permanent. The variety is certainly reliable, for it comes true from seed. May we beg our botanical collectors to keep one eye open during their rambles for the *Senecio.*

The poor dandelion has been more highly honoured, for it has had as many names almost as a Spanish grandee; here it is known as Taraxacum, there we see it Leontodon. In the "Student's Flora" the older name is used, *Taraxacum officinale* (Wig.). No common species yields so many varieties as this; for example we find:

1. *T. Dens-leonis* (Desf.). Leaves bright green, broadly runcinate, outer bracts of the involucre recurved.

2. *T. erythrospermum* (Andr.). Leaves dark green, often *glaucous*, outer bracts spreading.

3. *T. lævigatum* (DC.). Leaves dull green, pinnatifid, or cut up into linear segments, generally small, or about 3 or 4 inches in length.

4. *T. palustre* (DC.). Leaves, when in rich soil, entire and deeply-toothed.

The above are all easily recognised; nay, speaking with a learned botanist from Narbonne, he pointedly declared his conviction that Nos. 2 and 3 were good species. The flowers differ so little from the normal form that I do not think they are reliable as characters, although Babington seems to depend much upon the outer bracts; however, flowers can be found where the bracts vary widely on the same plant. The leaves preserve the same peculiar shape under all circumstances; I can with every confidence rely upon them. *T. lævigatum* are very peculiar, being cut to the midrib into long linear leaflets. The opposite extreme is seen in *T. palustre;* here the leaves are in some examples quite entire, whilst the rich emerald-green tint of *T. Dens-leonis* can seldom be equalled. Taking it all in all, I know no species so full of interest. In my British herbarium I have about ten sheets filled with this species.

J. F. R.

THE DERBYSHIRE CAVERNS.

UNDOUBTEDLY many visitors to the British Association meeting at Sheffield will avail themselves of the neighbourhood of the Peak (only some twenty miles away) to explore its wonderfully lovely dales and caverns. We extract the following account of the "Speedwell Cavern," at Castleton, from "Geological Essays, and Sketch of the Geology of Manchester and the Neighbourhood," by J. E. Taylor (published in 1864).

The entrance to the "Speedwell" mine is by a door in the hillside, strongly reminding one of that which Bunyan mentions in his "Pilgrim's Progress," as shown to Christian by the shepherds. In at this door one starlight night in February, some four or five of us entered, each laden with a wardrobe of miners' clothing wherewith to bedeck ourselves. Entering at the cottage by the side of the cavern, in which the guide usually lives, we found a cheerful fire burning. We speedily converted this into a dressing room, and then turned out in anything but a photographicable condition. I may, observe, however, that the cavern itself, the "Speedwell" mine, does not require this trouble at the hands of ordinary visitors. It is, as the handbills advertise, "quite clean and fit for ladies to visit." There is also an intelligent guide to accompany them, and to point out various objects worthy of remark. Entering in at the door by the hillside, we descended a flight of upwards of a hundred steps, and at the bottom, to our astonishment, found a boat ready to row us along a subterranean passage in which was about three feet of water. There was just sufficient room to sit upright

in the boat without knocking our heads against the top; and along this passage we were rowed for a distance of nearly half a mile, lighting the way as we went by sticking candles against the wall. When we had gone some distance from the place of embarkation we looked behind us and the reflection of the lights in the still water was beautiful, reminding one more than anything else of a long street lit up by gas. This is the passage which was literally hewn out by the muscle and sinews of the miners in their search after lead; and we could see one or two thin veins of that metal crossing the cavern transversely. The stillness, at first, seemed almost unearthly, especially when we coupled with its effect the remembrance that it was night. But, by-and-by, we could hear a faint droning sound. On asking whence it came, we were told to our astonishment, that it was caused by the water upon which we were sailing falling over a cataract into what is called the "bottomless pit." As we proceeded, the noise increased until at length we had to speak in a different note in order to hear each other. We were so completely interested with the uproar that we did not notice the boat had stopped, until one of the company drew our attention to it. A large rock had impeded our course, and to it we moored the boat when we had landed. Raising our candles over our heads we perceived a mighty cavern, whose darkness our feeble lights only seemed to render more obscure. On each side, high as we could look up, huge rocks hung over, as though ready to topple on our heads with the least disturbance.

But the sight was inexpressibly grand when, after lighting a rocket, the hissing and blazing torch mounted upwards for more than three hundred feet without reaching the top. As it ascended, the darkness below became more and more palpable, and the dazzling light above our heads revealed a similar arrangement of rock masses to those which we could see below by the faint light of our candles. The whole effect was most striking, and had much of the character which Martin has thrown into his wonderful picture of the "Great Day of His Wrath." I shall never forget it; that sight has haunted my imagination scores of times since. But we now turn our attention to the falling volumes of water as they dashed over the precipice. This is protected by a strong iron "railing;" and a dazzling "Roman light" held over showed us a yawning chasm, into which the seething waters hurried themselves. We could not see the bottom, although it is known that a communication exists between this and the "Peak cavern," a mile away, for sawdust thrown into this stream has been carried out by the rivulet which flows from the latter cavern. These sights are those usually shown to visitors, and well are they worthy of visitation; for it is seldom that such great natural phenomena are to be found within so short a distance. But, as we passed along by the tunnel to the cavern I have mentioned, we had noticed several small passages branching out on our right hand, and now we returned to make our explorations in them.

Nobody had entered them for years, and we were making the experiment for the sake of obtaining some rare minerals, which, we had been told, were found on the walls. Each of us was armed with hammers, and with our "toilette" of miner's clothing, were well prepared to "rough" it. So, in returning, we stopped at the mouth of the right-hand passage, called the "Half-way House," and fastened the boat firmly to the rock—for had it chanced to drift away we should have had a quarter of a mile to wade through a stream three or four feet deep, whilst the owner would have had to perform the same feat right to the other end to bring it back. As we got out of the boat we had about a foot of water to wade through, along a narrow and dripping passage, for about a hundred yards, cramping our backs with the constant bending. We were relieved at the end by being able to stand erect in a vast rent in the rocks, extending so far above our heads that the dim light of our candles could not enable us even to guess its height. Between the walls of this fissure, which was three or four feet across, there were bars of wood placed to serve as staves, and fastening our hammers in our belts and sticking our lights in our hats, we mounted up one after the other. It was a somewhat dangerous task, for the bars of wood had been placed there for more than thirty years, and were now rotten from the constant moisture to which they had been subjected, so that if the leading man had made a false step and tumbled down, he would have sent us all before him like a set of skittles. At last, after mounting some hundred feet or more, we reached the top, and found a passage similar to the one along which we had waded, extending in a westerly direction. Along this we made our way with bended backs, with the danger of breaking our shins over an old waggon, which had been left by the miners years ago. Here we could see the lead vein crossing the path, the matrix in which it occurred being filled with cawk or sulphate of barytes in an uncrystallised form.

Farther on, the passage was so narrow that we had to crawl on our knees among mud and débris; all this labour being abundantly recompensed by discovering that, a little further, the masses of rock were covered with crystals of carbonate of lime of various sizes and forms, but chiefly of the "dog-tooth" shape. These presented the appearance of having been dusted with loaf sugar, owing to smaller crystals having been formed upon them. Here we obtained some magnificent specimens, the most curious being a dog-tooth crystal of calcite, with a cubic one of fluor, perfectly blue, mounted on the very apex. Standing out in relief were numerous fossils, long jointed stems of Encrinites, shells of Spirifera, Orthocera, and a host of others. Already the weight behind had bulged out the front part, and the whole seemed as

though it only needed one of the foot-stones to be loosened for it to come thundering down. But if nothing else had repaid our labours, certainly the sight of the magnificent cavern into which we now entered, did so most amply. When we had all got together, we looked around us, and the surrounding scenery was most impressive. The wide vault, hid by the blackest darkness above our heads, the masses of rock at our feet, made us feel like pigmies when gazing upon this work of nature. The effect was more striking when we burnt a Bengal light, which threw out the light and shade of the overhanging masses into splendid relief: the thousands of crystals of various shapes and colours, which reflected the dazzling light in a thousand coruscations, left us almost speechless with astonishment and delight. After attempting to make our way in other directions we had to give up, owing to the passages narrowing so much as to prevent us even from crawling along. In fact, all the hills hereabout are quite hollow, and the subterranean passages extend for miles, widening and narrowing alternately as they run along. Descending in safety we found the boat moored as we had left it, and another quarter of an hour brought us into the clear starlight.

HOW TO FOUND A ROOKERY.

By Mrs. Tilt.

In answer to the question that has been asked in your columns as to the best means of founding a rookery, I can mention an instance in which a large one was established by the kindness shown to a solitary rook one severe winter. For many years it had been our great ambition to have a rookery; there were several large ones in other parts of Cheshire, and what was considered to be the mother-rookery was about two miles from us. The keeper had obtained rooks' eggs, placed them in nests in tall trees thought likely to attract them, but all to no purpose. But one severe winter there came regularly every day, with some pet bantams that were fed by the house-keeper out of the window, a solitary rook and fed with them, becoming at last so tame as to hop on the window-sill. In the spring this tame rook brought a mate, and together they began to build in a small Spanish chestnut tree, so close to the house that from the upper windows we could see quite into the nest. It made great excitement watching the progress of this nest, as it is considered to bring good luck to a house when rooks build near it. The nest was about half finished, when, one morning, a great noise was heard, and we saw about a dozen strange rooks violently attacking the old pair, and tearing the nest to pieces. They did not attempt to build again that year, but the next spring the same thing occurred. They got so far as to lay their eggs, when the female bird was suddenly attacked one morning when she was sitting by a dozen and more of rooks, and the noise was such as to collect the whole household to watch the battle. She made a stout defence, and it was some time before they beat her off the nest, dashing it with its contents to the ground. This was repeated a third year, when we began to despair of having our rookery, but on consulting a book on natural history we found it stated that it was generally four years before a pair were allowed to establish themselves independently from the mother rookery. At all events it was so in this case, for the following year they not only brought up a brood of young birds without being molested, but each year after the nests in the same tree increased in number, and eventually they spread to other trees close by. It was so far satisfactory to have established our rookery, but unfortunately, the grateful rook had chosen the nearest tree to the window where he had been fed, and their close vicinity to the house proved at last so objectionable that it was found necessary to drive them further off, by gradually cutting down the trees they had chosen. With the curious instinct that rooks are supposed to have with regard to trees that are destined to come down, though they were left in peaceful possession of the original tree they had chosen, and which had nine nests in it, they wisely left it, and established themselves in a clump of large trees at a more convenient distance. Every year after this the rookery increased in size, and in the space of ten years, from the time the parent birds made their first attempt to build, the rookery has grown so large that we have been advised to shoot some of them in the spring, for fear the rooks, "becoming too numerous," should fight and break up the colony.

This is only one more instance of the power of man over animals, and shows that the secret of that power is kindness.

ODDITIES AMONG SEA-BIRDS.

By P. Q. Keegan, LL.D.

A STRANGE, odd, fantastic, eccentric appearance or deportment exhibited on the part of a human being, or by one of the lower animals, is, under ordinary circumstances, if not pitifully, at least ludicrously interesting. We are deeply conscious that something is wrong somewhere or somehow, that the ordinary rules and dispensations of nature are, in this instance, violated or replaced, their provisions unduly restricted, or inordinately and absurdly overstrained, and the contrast thus furnished, being generally striking, our risible faculties are excited, and we indulge in a burst of laughter. Sometimes in the midst of an accompaniment of differences, we perceive a strange resemblance to some external object. Thus, for instance, when we witness the pranks, gambols, and extravagances of a monkey, we all the while perceive therein a certain

resemblance to the human face, hands, and facial expression, but qualifying this, we observe, at the same time, fundamental diversities in respect of shape, colouring, speech, posture, etc.

But independently of such resemblances and other relations to foreign objects, sundry animals possess certain curious appendages which, either by reason of their excessive and disproportionate size, or of their uncommon shape, colouring, etc., inevitably excite our laughter. Just in the same manner as we jeer and laugh at the drolleries, comicalities, and eccentricities of a clown in the circus, or of a comedian on the stage, so do we feel amused and exhilarated with certain extraordinary appearances, etc., on the part of animals; the extraordinary-looking beaks of the

Fig. 136.—The Puffin *(Fratercula arctica)*.

toucans, the hornbills, curlews, etc., seem out of all proportion to the size and apparent requirements of these birds. So likewise the long, lank necks and shanks of the cranes, herons, etc., are provocative of merriment, especially when we observe them erect on some desolate sea-shore, as if fixed in thought—in a "brown study," with the head poked out forwards in a curious "contemplative" attitude.

Some singular fidgety deportment, some extraordinary aspect of eye or countenance, denoting in either case an unnatural, unhealthy excitement, or even an abnormal suppression of animal force, is often very ludicrous to behold. A bird performs some operation (such as that of incubating) with an amount of gravity and an air of importance utterly disproportionate to the consequence or influence thereof in the economy of nature. During the breeding season the Common Guillemot may be observed upon the extremity of some protuberant ledge of rock perched upon a single egg, in such a manner as if the whole economy of the world depended upon the issue of the process. There is a knowing look, too, about certain animals which is equally interesting. Thus we often say of a certain cat or dog, that he is very wise or knowing-looking. Certain attitudes assumed, or certain movements executed are also irresistibly funny. A young kangaroo popping its head and tail out of its mother's pouch, or vaulting nimbly therein from the ground, furnishes an undoubtedly ludicrous spectacle.

Within the necessarily restricted limits of a paper of this description, it would be idle to endeavour to

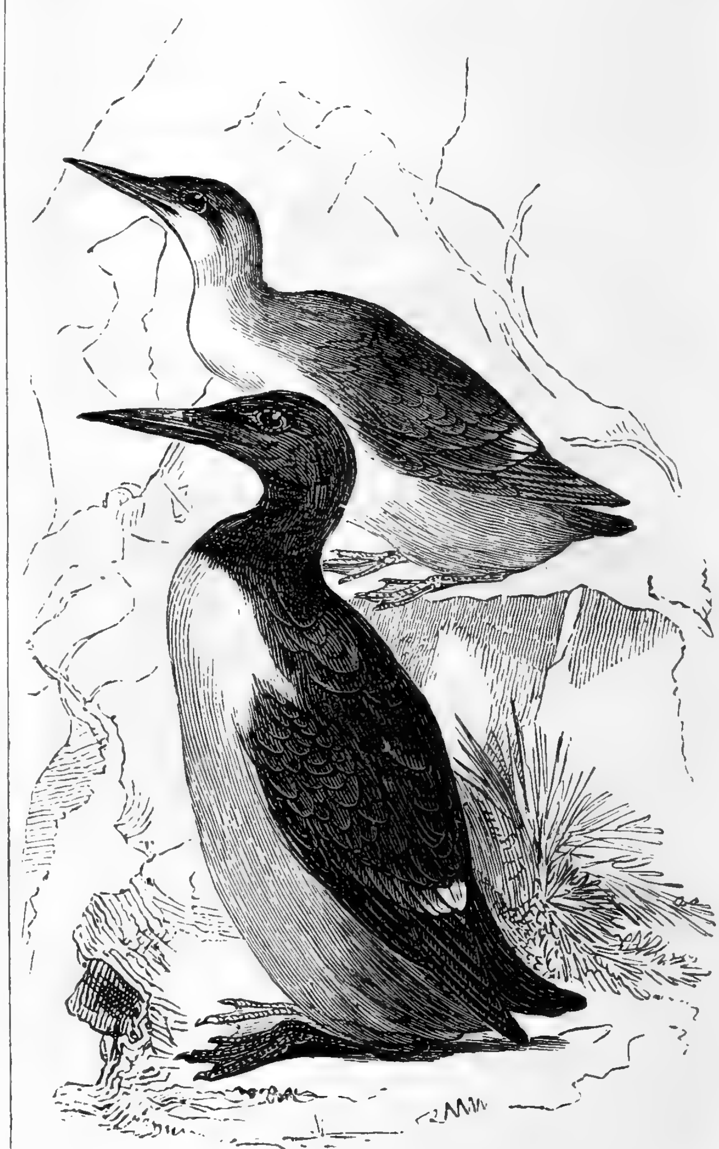


Fig. 137.—The Common Guillemots *(Uria troile)*.

investigate the primary or fundamental cause of the aforesaid eccentricities. Nevertheless, in a general way we declare, that just in the same manner as a violent disturbance, or an undue depression of animal or nerve force occasions the extravagant deportment, opinions, and feelings of insanity, so this same excitement and depression, when manifested in a less marked degree, induces the less momentous and intense form of oddity now adverted to. Sea-birds, as a rule, are not particularly odd or funny-looking, either as respects their appearance or their conduct. Nevertheless, there occur very odd and singular creatures amongst them, some of which, and in the first place,

the Puffin (*Fratercula arctica*), I shall now proceed to describe.

Shortly after the occurrence of the vernal equinox, when azure skies and exhilarating gales betoken the advent of spring, away, far out upon the deep, where some desolate, wave-worn islet or islanded cliff towers above the waves, or fast by some dreary sea-shore, flanked by a tall, beetling armoury of inaccessible rocks, vast bands of sea-birds assiduously prosecute their breeding duties. Not surmounting all the seats of the assembled congeners, but ranged in a modest position about the middle of the cliff, there may readily be discerned a lengthy array of curious perforations, somewhat resembling an extensive rabbit warren. These are the breeding resorts of the comical little Puffin. Externally everything would seem to be in comparative repose; but just let anybody try the experiment of thrusting his bare hand into one of these holes, and he will have ample reason to repent of the proceeding, for assuredly he will receive a sharp bite from a most formidable, eccentrically-shaped bird beak. Presently the body of the bird to which this curious appendage belongs, will appear and assume a threatening attitude towards the invader of its chosen haunt.

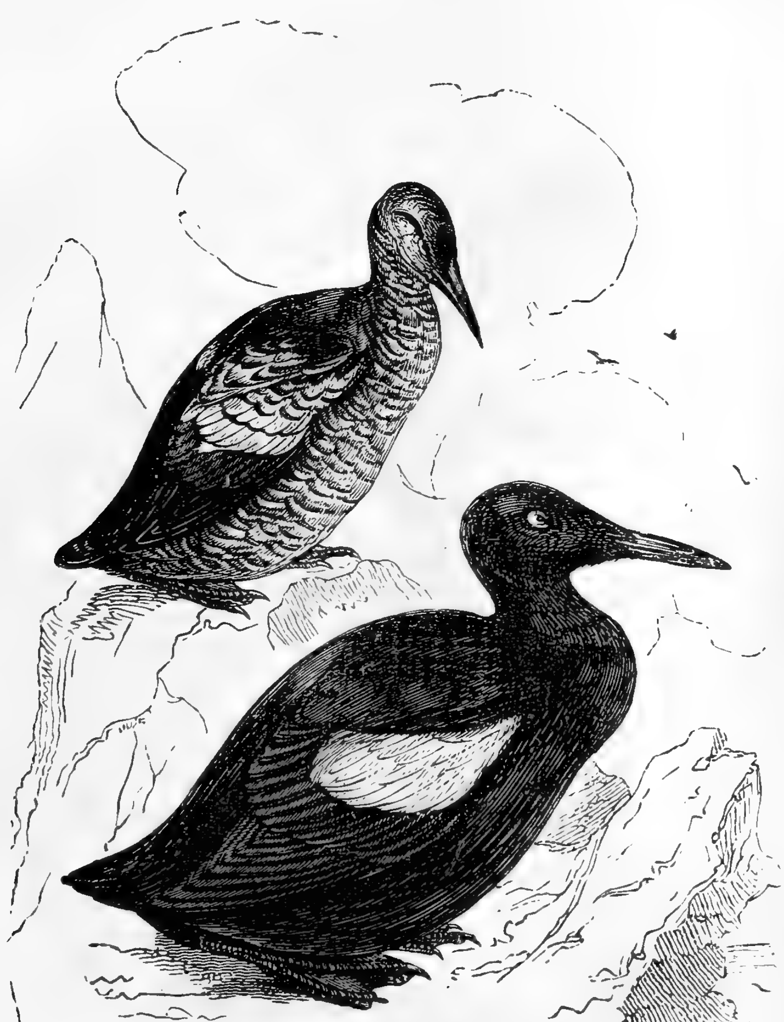


Fig. 138.—The Black Guillemots (*Uria grylle*).

The Puffin is about a foot in length, with black wings and back; a black collar round the throat; white cheeks, chin and breast; orange legs, blackish-brown claws, and a very comical expression of countenance. The aforesaid beak is sharp at the point, compressed laterally, and bears three grooves on the upper mandible and two on the lower. The colouring of this beak is as fantastic as its shape. The lateral ridge of the upper mandible is greyish-yellow, and that of the lower mandible orange-red, the triangular space in front of both being orange-red and bluish-gray. When inspected from a short distance, it would appear as if somebody out of sport had clapped a glued and horny mask upon the bird's face, so extraordinary does this beak-like appendage appear. An utter incongruity is perceptible somewhere or other; the face and top of the head are curiously projected, and, at the same time, flattened laterally, a circumstance which imparts to the former an unequivocally ludicrous expression. The appendage, moreover, imparts a species of domineering pomposity to the bird, which seems manifestly incongruous with the size and combative capacities thereof.

But although not particularly handsome, at least so far as form extends, the bill is, nevertheless, eminently useful to the puffin in three ways. In the first place, it is thereby enabled to capture fish. The bird dives expertly, and swims under water by means of the conjoint action of feet and wings, until a desired morsel is securely grasped in its mouth. This is commonly a sprat, or other such fish, and frequently some six or seven (eleven have been seen) of these choice morsels are observed hanging in a row dangling free along the bird's beak, all doomed soon to pass through "red lane." Again, the burrows or breeding holes, already adverted to, are often originally constructed by the male puffin digging and tunnelling with resolute zeal and invincible perseverance, into the sand, until a winding aperture is hollowed out, in some cases eighteen inches, in others, three feet or more in depth. Frequently, however, the rights of property and of prescriptive possession are not at all respected by this impudent little sea-bird; for when an already constructed rabbit-hole happens to be fixed in a suitable situation, it will take forcible and immediate possession thereof. Nor will it allow its tenure to be disturbed; for after sundry combats with the former denizen, in which, by the way, the sharp beak proves of eminent service, it will violently eject the poor rabbit out of house and home; and, upon the principle that might is right, forthwith and without scruple, instal itself in the vacated seat.

The prodigality of animal life inherent in the sea-birds now under review, is exhibited under the form of great liveliness, smartness of movement, pugnacity,

courage, and general activity (they sometimes travel twenty or thirty miles for food). Amongst human beings we do not commonly encounter displays of oddity amongst the gay and effervescent spirits. On the contrary, peculiarities of manner, opinion, conduct, etc., generally originate in severe, taciturn, grave dispositions, or rather in these when placed in easy circumstances, or when following a career in life (such as that of a sailor) which involves no cankering care, no heart-shaking anxieties, fears, and apprehensions.

The Puffin, too, notwithstanding the apparently malevolent disposition involved in the aforesaid violation of the rights of property vested in rabbits and other animals, manifests at times great kindheartedness and sympathy towards members of its own species. When a flock of these birds happens to be assailed by the fire of the sportsman, and one of them falls wounded or dead into the water, its mate, or even a stranger, is frequently observed to alight and swim round it, vainly endeavouring, by means of pushing and coaxing, to arouse it from that last long sleep that will endure for ever.

An unequivocal oddity of appearance is also exhibited amongst sea-birds in the case of the Black Guillemot (*Uria grylle*), with its long sharp beak, elongated body, legs sticking out behind, and singular white patch upon the wings. In the breeding apparel, the plumage of this bird is entirely tinged with a deep brownish-black shade, which on the upper surface is beautifully glossed with bronze and purplish-red. The quills and secondary feathers of the wings are tipped with grey, and there is an oval patch of pure white upon the wings. The bill is black; the legs and feet are vermilion tinged with carmine, and the claws black. This curious, fantastic distribution of colouring conspires with the peculiarly-shaped, "smart-looking" bill to impart to the bird a ludicrously self-complacent, eminently self-satisfied appearance.

When the breeding duties of this sable sea-bird have terminated, i.e., about the 1st of September or rather earlier, it cheerily betakes itself to a career upon the ocean. Frequently during the autumn and winter months, towards the centre of or impending over Scottish bays, creeks, estuaries, rocky islets, etc., a very oblong, darkly-painted figure may be discerned careering over the surface of the waves. It is of a bird-like shape, with long protruding beak, and legs sticking out prominently behind, and seems flying away in hot haste and with anxious precipitation. Presently, however, this eccentric specimen of animal life alights complacently upon the crest of some breaking wave, and after indulging in a little lively swimming exercise (probably by way of digestive preparation, or appetite sharpening), it suddenly, and apparently for no cogent reason in the world, makes a great splashing with its wings, and then heels over and disappears from view. The bird has descended into the watery chambers of the ocean in quest of a fish, or some other equally nutritive substance that may serve to quell the ragings of hunger, and to furnish bodily sustenance. As the creature proceeds under water a number of air bubbles cling to its oily plumage; and provided only that the liquid medium be sufficiently quiet and transparent, the spectacle furnished by the moving bird beneath is marvellously beautiful. An oblong, beautifully-modelled, blackly-painted animal form, studded, as it were, with brilliant stars and diamonds, and executing a series of graceful manœuvres down in the sea-green depths, is a spectacle of rare æsthetic interest. But the deportment of this charming little bird upon the surface is none the less interesting. In the wildest sea, when each wave was embossed with a creamy foam, we have seen this bird, with its attendant troupe of young, riding buoyantly and paddling about as if beyond all measure charmed with life and its enjoyments.

The flight of the bird now under review is rapid and continuous, and is characterised, moreover, by a curious revolving, or rather oscillating motion effected in such a manner as to occasion a curious alternation of form and colour. The black painting of the lower parts of the bird is, at one time, exposed to view, and one would think a completely sable animal was being observed. Presently, however, the flying body oscillates slightly, and then the ludicrous wings, with their large, oval-shaped, whitish-coloured patch, come prominently under notice.

(*To be continued.*)

NOTES ON BLUE FLOWERS.

SIR JOHN LUBBOCK makes the remark that the Bees with which he experimented with a view to obtaining a knowledge of their colour-sense, seemed to have great difficulty in determining between artificial *blue* and *green* colours. It is generally regarded that gamopetalous flowers, or flowers whose petals are united into a single piece, are better adapted for the visits of butterflies and moths than bees. I have been particularly struck with the much greater proportion of *blue* flowers among gamopetalous plants than among polypetalous, which would be comprehensible on the ground that bees could not effectively determine the colour of blue so well as butterflies. In that case we might reasonably expect that blue flowers would have more butterfly than bee visitors, and would have been gradually adapted to the latter rather than to the former. Taking a rough census of the colours of our British flowers, we find that only ten species are marked as "blue" among the polypetalous kinds, and of these some are very doubtfully "blue," such as the Vetches (*Vicia cracca*, *V. sepium*, *V. hirsuta*, *V. tetrasperma*, etc.); for red has been called in as an auxiliary (and red is a very luminous

and far-seen colour) in order to make up some tone of purple. Among the violets, also, we have a tendency to purple and even white varieties, instead of a fixed determination to stick to blue; as if the latter colour had been found not to answer. Those polypetalous flowers which have most faithfully adhered to a blue colour (as regards our British flora) are included in Linaceæ. The milkwort is usually called blue, and its blue is of a dark and lovely colour; but every one knows that this plant bears pink and white varieties, in some places quite as commonly as the normal blue flowers. On the other hand, we find that among the gamopetalous division of our British flowering plants, no fewer than fifty-seven species (against ten of the polypetalous) are decidedly blue. In addition, there is quite a host of which I have taken no statistical heed, marked "lilac," "purplish," etc., in which *blue* is a colouring agent. Of the gamopetalous orders Boraginaceæ and Campanulaceæ are the most conspicuous, the latter bearing little besides blue flowers and possessing corollas of the most typically gamopetalous character. Of course polypetalous flowers are visited by butterflies as well as bees, and it would be interesting to note if the former, rather than the latter, picked out the blue kinds. I only offer these remarks as tentative. Is there anything in them?—*J. E. Taylor.*

OUR COMMON BRITISH FOSSILS, AND WHERE TO FIND THEM.

No. VIII.

By J. E. Taylor, Ph.D., F.L.S., F.G.S., &c.

We have already seen that, to a great extent, Encrinites occupy the place in the rocks of the Palæozoic epoch which sea-urchins and their allies do in the Secondary strata, and in the seas of the present day. The sea-urchins proper are more abundant now than at any previous period in the world's history. They inhabit every sea, and almost every shallow and depth in the seas. More than at any other time one modern group of them (the Echini) merit the name of Echinodermata, or "spiny-skinned," given to the entire order. The common sea-urchins, such as *Echinus esculenta* or *E. miliaris*, are covered with what are not inaptly called "spines."

The Echinodermata are doubly important, on account of their numerical abundance and wide distribution in the seas of the present day, and their great geological antiquity. We have already noted their general persistence in the rocks of every geological epoch since the Silurian up to our own, and that we find their species and types increasing in number in proportion as we approach the present epoch. The common Sea-urchin (*Echinus miliaris*) is a familiar example. It well deserves its name, for, when alive, it is so thickly covered with spines, as to greatly resemble the common hedgehog; when dead, these spines peel off, and then the surface is seen covered with minute knobs or tubercles, to each of which a moveable spine was attached, on the principle of the ball-and-socket joint. The shell is composed of carbonate of lime, and is made up of an innumerable number of separate pieces, all of which are mosaicked together. No fewer than six hundred of these go to make up the entire "test," as the shell is technically called. And yet, although in the adult state it may be several inches in diameter, the shell has not been moulted since the animal was no bigger than a pea! There is a membrane lining the exterior of the test or shell, and this has the power of secreting the carbonate of lime diffused through sea-water. As the membrane is inserted between every one of the six hundred and more plates, it is able to add lime along the edges of each, and thus the whole structure grows out uniformly and symmetrically, almost like the expanding of a bubble when blown out. A more beautiful architectural contrivance could not be imagined than is thus furnished to us by this insignificant creature!

Take one of the rounded tests you may have picked up at the sea-side, out of which the animal has been removed, and hold it up so that the light may be seen through it. Besides the large apertures at the top and the bottom (anus and mouth) you perceive rows of minute punctures radiating down from the summit to the base. These punctures are called "ambulacral pores," and the plates (of which there are five rows) in which the pores occur are termed "ambulacral plates," for a reason that will shortly be seen. In addition to these, there is a plate specially perforated, called the "madreporiform tubercle" (on account of its being as porous and spongy as the common Madrepore coral), and its office seems to be to admit the sea-water as a filter. From this a sort of canal proceeds *internally* to a tube which surrounds the gullet at the base of the shell or test like a ring. From this circular canal there radiate, like the arms of a star-fish, certain other canals which pass in front of the rows of perforated plates, and meet together at the top. Each of these five canals gives off in its course innumerable tubes, which can be protruded through the little punctures at the will of the animal. At the base of each little water-tube, on the other side of the canal, is a little water-bag, and when this is compressed (as when a boy squeezes a hollow indiarubber ball he has first filled with water) the minute water-tubes, or "ambulacra," are lengthened even beyond the spines of the animal. Myriads of them can thus be protruded whenever the sea-urchin thinks fit, and they may then be seen wriggling and moving about like so many worms. At the base of each is a sucker, and so, when a few scores of the "ambulacra" are thrust forth, and have attached themselves to any object, they are enabled to

warp the entire shell along (fig. 139). It is in this way, in fact, that most of the true Echinodermata crawl along the bottom of the sea. The reverent reader cannot fail to be struck with such a beautiful piece of construction, and a hint might here be furnished to our best hydraulic engineers. That this principle has been in vogue for myriads of years is evident by the similar construction of the ancient sea-urchins. Thus in the

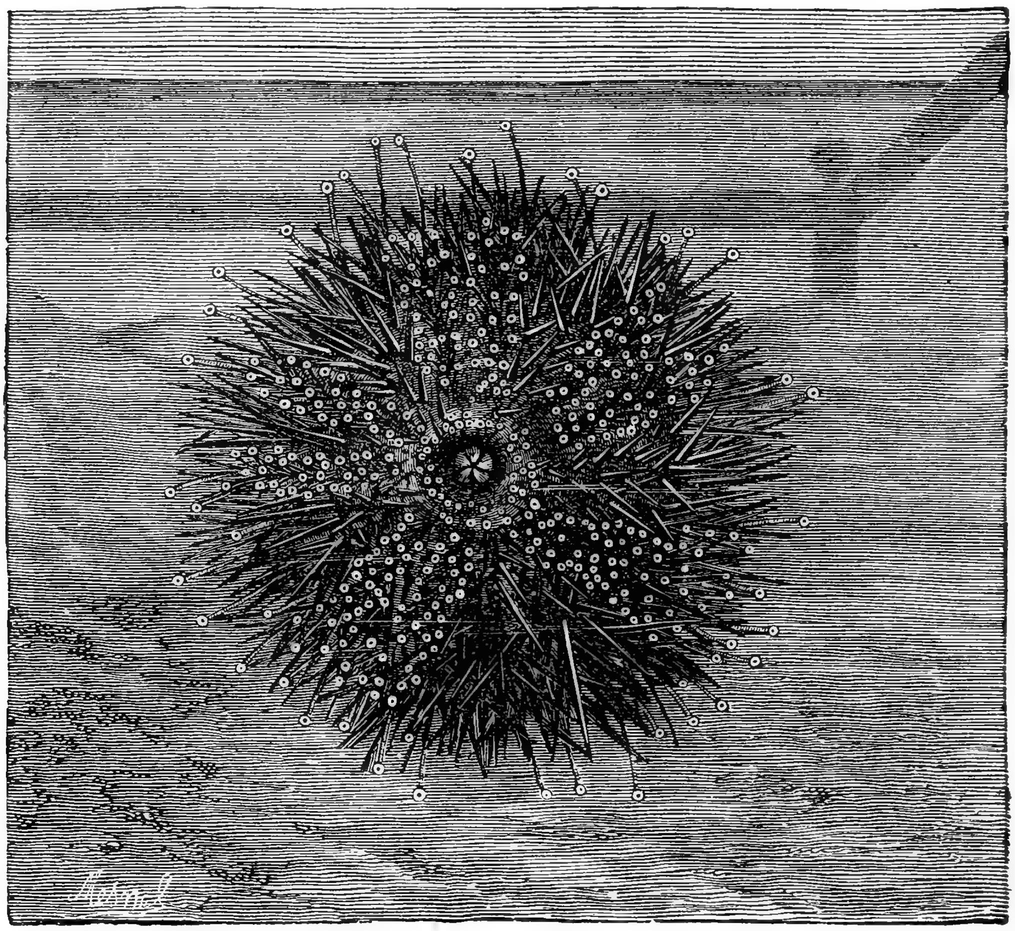


Fig. 139.—*Echinus* climbing glass side of aquarium, and showing mode of attachment of ambulacral sucking feet.

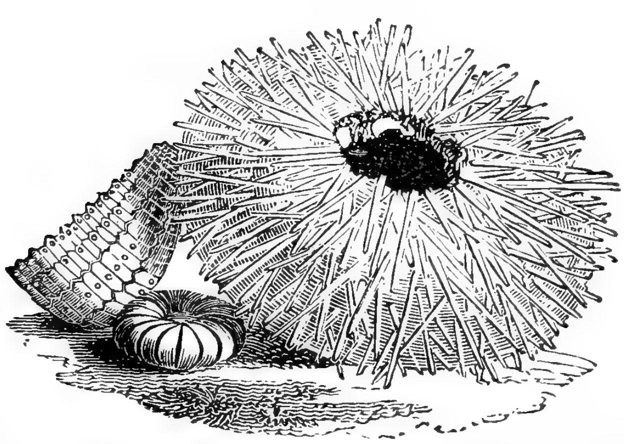


Fig. 140.—*Echinus esculenta;* on left-hand side is a fragment of test denuded of spines, and showing plates.

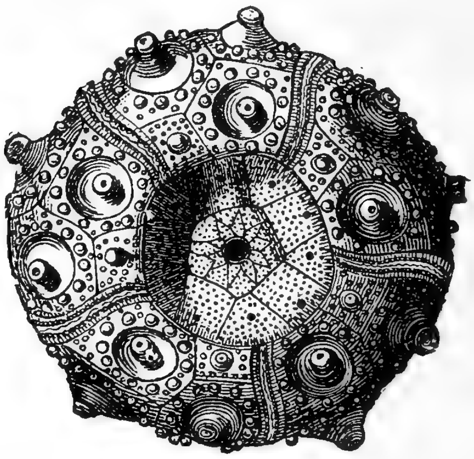


Fig. 141.—Test or shell of *Cidaris coronata,* showing the tubercles to which the bases of spines are attached; Oolitic formation.

"Fairy loaves," as they are called in the Eastern counties, where they literally abound (the chalk fossils known to geologists as *Ananchytes ovata*), you see five similar rows of perforations; and even the somewhat differently fashioned tests of the earliest genera of sea-urchins (Palæechinus), dating from Carboniferous if not from Silurian times, possess perforated ambulacral plates, showing that these very ancient fossils were already in possession of the hydraulic principle which has been of such inestimable value to their race. The Ananchytes of the Chalk, however, has very small tubercles, and the spines formerly attached to them must have been very small and bristle-like, as is now the case with those of the living cake-urchin, *Bryssus lyrifer*, not uncommon in the muddy bottoms of the Kyles of Bute, the *Spatangus*, *Amphidotus*, and many others. This is not the case with the Cidarids found fossilised in the Chalk with them. The very large knobs or tubercles on the tests of the latter animals (which are especially abundant in tropical seas at the present time) give support to large spines, of a club-shape generally, and often ornamented by various devices. Their ball-and-socket principle of jointing, however, was in use in, and has been ever since, the geological epoch termed the Silurian, when the Echini were first introduced. In the Oolitic strata we meet with some of the handsomest specimens of Cidarids, and what is very peculiar is that, like the fossil Oolitic corals, the fossil Cidaridæ resemble species now living in tropical and subtropical seas. The "cake-urchins," of which our recent British species of *Spatangus* is a well-known example, date from the Cretaceous, or chalk period, for the fossils are so common as to have obtained the popular name of "hearts" in chalk districts. These include both Spatangus, and a genus called Micraster. In number of species, however, and variety of external form, these Echini

are most abundant in Tertiary strata. It is a peculiar law in the history of a race of organic beings—that they have a period of introduction, one when they reach their maximum, both numerically and in variety of species, and another when these drop off one by one, and the race becomes extinct. We then find that the functions they performed are taken up by some other kindred group of animals, which, as a rule, are more highly endowed and specialised, and so have been able to thrust aside and extinguish their older comrades; just as British weeds are now supplanting the native weeds of New Zealand and elsewhere.

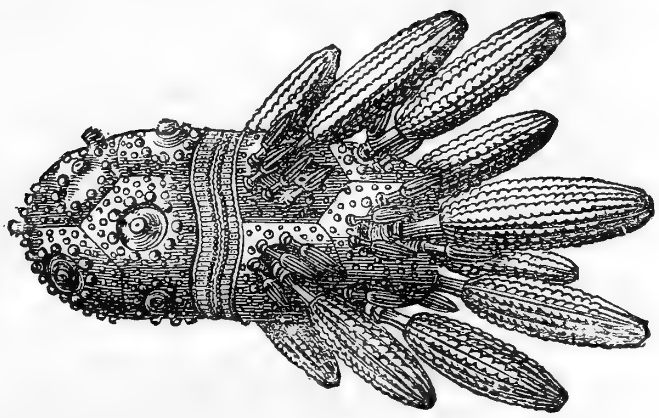


Fig. 142.—*Cidaris coronata*, showing mode of attachment of the club-shaped spines.

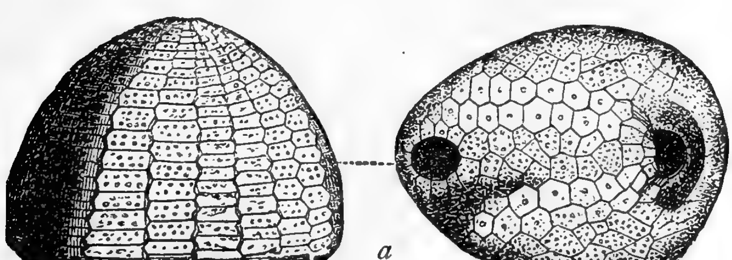


Fig. 143.—*Ananchytes ovata*, or "Fairy loaf"—a common Cretaceous echinoderm; *a*, base, showing position of mouth and anus.

The nervous system in modern sea-urchins is placed round the mouth, which is furnished with five hard calcareous teeth, to enable it to triturate its food. These teeth are worked by muscles, through loops, and the whole can be removed as easily as an artificial set of teeth. In this state the mechanism goes by the name of "Aristotle's Lantern," and the seaside picker-up of "unconsidered trifles" frequently finds it lying by itself after the more fragile test has been broken to pieces. We have seen silicified specimens of Echini in Chalk flints near Norwich, which have had these teeth fossilised, but such examples are exceedingly rare. Nevertheless it affords another instance of the persistency of a plan. Generally speaking, the larger number of the Echini of the Chalk seas had the mouth and anal aperture at the base, and such genera as Ananchytes, Holaster, Micraster, Galerites, etc., are grouped according to the position of these apertures, which is always constant in the same species. In the recent Echinus, as well as in the fossil Cidarids, the mouth is at the base and the anal orifice at the summit.

The modern Bryssus (as we have already noted) buries itself in very fine mud, on the organic matter of which it appears to feed, just as earthworms do on the black soils. The Micrasters and Spatangi of the Cretaceous period, which approach the Bryssus very nearly, both as to shape and structure, undoubtedly buried themselves in the chalky mud of the ancient sea in a similar manner. Some of the modern Echini, on the other hand, appear to have the power of hollowing for themselves holes in the rocks by the sea, especially in limestone rocks, which are not unfrequently found

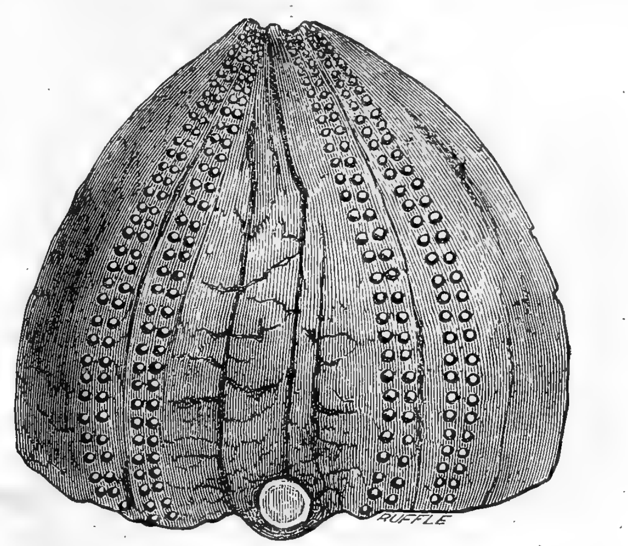


Fig. 144.—Natural flint cast of interior of *Ananchytes*, showing the perforations (in relief) for ambulacral or sucking-feet.

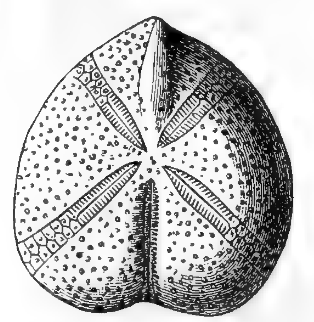


Fig. 145.—*Micraster*, a common Cretaceous echinoderm, showing the petaloid arrangement of the ambulacral areas.

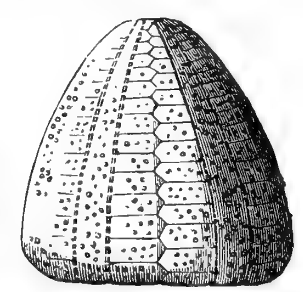


Fig. 146.—*Galerites albogalerus*, a common Cretaceous echinoderm.

riddled by them, just as they are by Pholas and other boring molluscs. A pretty little sea-urchin, not quite so big as a threepenny piece, which we find not uncommonly fossilised in the Red Crag beds, is the Echinocyamus. In some respects it is a connecting link between the Echini, or sea-urchins, and the "Heart-urchins," or Spatangi. The common "Sea-egg" (as fishermen call it), or *Echinus sphæra*, is as old as the Pliocene period, for we have found it in the Coralline Crag beds. The common "Sea-egg" however, is not the type with which we ought to compare the very abundant "Fairy-loaves" (Ananchytes) found in the Chalk, and which are so plentiful about Norwich. The mouth and anus of Ananchytes are both at the base, whereas in the sea-egg they are relatively at the

base and the summit. In the Ananchytidæ must be included the extinct genera, more or less common in the Chalk, of Holaster, Galerites, &c., in which the basal position of mouth and anus is slightly different. The nearest *living* type of sea-urchin, allied to the Ananchytes, or "Fairy-loaves," was dredged up in the North Atlantic during the "Challenger" expedition, from a depth of nearly three miles, and it is known by the name of *Calymne relicta*. The bottom of the Atlantic is remarkable for the number of creatures living there which are allied to those found in the fossil state in the Chalk formation. The family of sea-urchins called Pourtalesia is of this character, for it is allied to the extinct Ananchytes in many respects. But perhaps the most remarkable living Atlantic sea-urchin is *Salenia varispina*, dredged off Cape St. Vincent at a depth of nearly two miles. A few years ago this genus was believed to have been extinct for ages, for it was not found outside the Chalk, except the Acrosalenia of the London Clay, at Sheppey. Now it has turned up in the living state in the Atlantic. It is common in the Chalk near Norwich, and internal flint casts are also found there so abundantly that they go by the popular name of "Pick-cheeses"—"Pick-cheese" being the name given to the ripened seed-vessels of the common Mallow, which the flint casts of Salenia very closely resemble. Internal flint casts of Ananchytes, or "Fairy-loaves," are abundant wherever the Upper Chalk crops out, and they are often remarkable for possessing the clearest and most distinct relics, in relief, of the ambulacral pores. Salenia are especially numerous in the Greensand beds in the neighbourhood of Warminster, in Wiltshire, one of the pleasantest spots for geologising about that the student could desire.

In the oldest known type of Sea-urchin (*Palæechinus*) the test or shell was composed of more than twenty rows of plates, and the entire test was of a remarkable egg-like shape. Archæocidaris is the oldest known Cidaris, or Knobbed Sea-Urchin, and it occurs in the Devonian rocks; but one species (*A. Urii*) is not uncommon in the Carboniferous Limestone of the Derbyshire Peak district, and we have found its spines somewhat plentifully in the queer little limestone quarry at Hafod, near Corwen, in North Wales. Palæechinus seems to occur most plentifully in the Carboniferous Limestone of Ireland. Some beds of the Inferior Oolite literally swarm with fossil Cidarids and Cake-urchins. The slabs of Oolitic limestone found in the quarries about Calne may be seen containing a dozen Cidarids, many of them with their spines still attached, just as when they were alive. Leckhampton Hill, near Cheltenham (from the summit of which the tourist can obtain a magnificent view of the Severn valley), is composed of rocks belonging to this formation, in which the Cake-urchin Clypeus is abundant, as well as various species of Cidaris. Hartwell, in Buckinghamshire, is another good hunting-ground for fossil echinoderms. *Clypeus sinuata* is a fine, large, well-known fossil, well distributed in the Lower Oolitic rocks; it is, perhaps, most abundant in Wiltshire; the Cotswold Hills have numerous outcrops where quarries are opened in their Oolitic rocks, in which Nucleolites, Cidaris, and Hemicidaris are frequently very abundant. These fossil Cidarids are very beautiful objects when denuded of their thick, club-shaped spines (fig. 141); the test is seen ornamented with and composed of a series of polygonal plates, each with a large round tubercle in its centre, and a pearl-like setting of a ring of smaller ones around it. Even the club-like spines are frequently beautifully sculptured, and the student can plainly see in their hollow bases how they were attached to the round tubercles, after the mechanical fashion known as a "ball-and-socket joint." The quarries at Calne and Chippenham, in Wiltshire, are especially famous for their abundant yield of fossil Cidarids. Various species of Cidaris are also found in the Kentish and Norfolk Chalk, either whole or as detached plates; and sometimes we find the impression of one of the latter on a flint, when it presents a very pretty appearance. Solitary club-shaped spines and impressions of the same in flint, are not uncommon in the Chalk formation generally. In the Greensand at Warminster, which crops out from under the escarpment of the Downs, the geological student may find a good assortment of fossil echinoderms, such as Nucleolites, Caratomus, *Cidaris pusio*, *Goniophorus favosus* and *G. lunulatus*, *Holaster granulosus*, *Micraster lacunosus*, *Salenia clathrata*, *S. geometrica*, *S. ornata*, *S. umbrella*, etc. Faringdon, in Berkshire, is another rich Greensand abounding in fossil Cidarids where *Salenia petalifera* is especially plentiful. Charlton, near Woolwich, is a good place for Chalk Cidarids; and the well-worked pit near the railway station will afford the student good specimens of many other Cretaceous fossils besides, whilst the Tertiary sands overlying the chalk sections are in places rich in peculiar fossils.

The rambler can hardly go into the wrong quarry in the Upper Chalk for Ananchytes, Micraster, Galerites, etc. They are especially numerous in the large chalk-pits which nearly surround the city of Norwich. The white-surfaced chalk-flints, which lie in heaps in the quarries ready for breaking up into road metal, should be carefully examined—if possible one by one. We have found many "fairy-loaves" and their kind half-imbedded in these hard flints, plainly showing that the latter must have been soft when the fossils were thus buried. Many of these chalk-pits are in lonely localities—just in the very places a man would select for quiet walks, or for their attractive scenery; and, indeed, the tourist finds that the fossiliferous rocks usually crop out where nature is apparelled in her most attractive garb.

(*To be continued.*)

AIDS TO THE CHOICE OF BOOKS ON BOTANY.*

By Bernard Hobson.

As I have learnt by experience that those who are commencing the study of any important subject are often at a loss to know what are the best books for the purpose, I hope that the following remarks may be of use to such persons, premising that though the prices given are the published ones some of the works are only to be had second-hand.

The best book for beginners (without depreciating other works) and all who wish to obtain a practical knowledge of Botany is the extremely lucid "Lessons in Elementary Botany," by Prof. D. Oliver, F.R.S., F.L.S., 18mo. 4*s.* 6*d.*; Macmillan & Co. It contains nearly 200 clear illustrations, the only fault of which is, that they never represent complete plants, but only parts. Typical plants of the chief British natural orders are described, together with the most important exotics, as bamboos, rice, cotton, tobacco, &c., and there is a very good index.

Another good work, excellently illustrated, is the "Vegetable World," by Louis Figuier, 471 illustrations, published by Cassell, Petter, & Galpin, at 7*s.* 6*d.* It describes, more or less fully, all the natural orders of plants.

The two following, published by Bradbury & Co., are clearly written and well illustrated. "School Botany and Vegetable Physiology," with descriptions of the chief European natural orders, by Dr. John Lindley, F.R.S., F.L.S.; and "Botany for Beginners," by Dr. M. T. Masters, F.R.S. (with very little on systematic botany). Other similar works are Henfrey's "Rudiments of Botany," foolscap 8vo., 3*s.* 6*d.*, Van Voorst, and "Elements of Botany for Families and Schools," Tenth edition, revised by Thomas Moore, F.L.S., 154 woodcuts, 2*s.* 6*d.*; Longmans.

Those who wish for cheaper books may buy "Outlines of Elementary Botany," by G. Bentham, F.R.S., P.L.S., Fourth edition, 12mo., 1*s.*, Lovell Reeve & Co.; a clear summary of facts without a useless word, but no illustrations or descriptions of natural orders. "Primer of Botany," by Sir J. D. Hooker, C.B., P.R.S., 18mo., cloth, 1*s.*, Macmillan, 68 illustrations, but not nearly so complete as Prof. Oliver's "Lessons," and containing next to nothing on systematic botany; Prof. Balfour's "Vegetable Anatomy and Physiology," 1*s.*; "Systematic and Economic Botany," 1*s.* (elementary); and two works under the same titles (advanced), 2*s.* 6*d.* each; Collins & Sons (illustrated). Prof. J. H. Balfour, M.D., F.R.S. L. & E., is also author of "Elements of Botany," foolscap 8vo., cloth, 427 woodcuts, 3*s.* 6*d.*, and "Outlines of Botany," foolscap 8vo., cloth, nearly 600 woodcuts, 5*s.*; A. & C. Black, Edinburgh.

More advanced works than any of the foregoing are: Prof. Balfour's "Manual of Botany" (structure, physiology, classification), Fifth edition, 963 woodcuts, crown 8vo., 12*s.* 6*d.*; also his very complete "Class Book of Botany" (structure, morphology, physiology, classification, geography, fossil botany, glossary), one large volume, 8vo., with 1800 illustrations, 21*s.*, (can, or could, be had in two parts), A. & C. Black, Edinburgh.

The splendidly illustrated "General System of Descriptive and Analytical Botany," by Le Maout and Decaisne, translated by Mrs. Hooker, with descriptions of every natural order, and 5500 woodcuts, imp. 8vo., 52*s.* 6*d.*; Longmans.

On special branches of botany are: "A Manual of Structural Botany," by M. C. Cooke, M.A., LL.D., twentieth thousand, 200 cuts, 1*s.*; David Bogue. "The Anatomy and Physiology of the Vegetable Cell," by Mohl, 8vo., 7*s.* 6*d.*; Van Voorst. "Botany, Structural, and Physiological," by O. W. Thomé, translated by A. W. Bennett, M.A., F.L.S., 600 woodcuts, 6*s.*, Longmans; a text-book which may be considered as introductory to Julius Sachs' "Text-Book of Botany, Morphological and Physiological," translated by Bennett & Dyer, 500 illustrations, 848 pages and index, royal 8vo., half-morocco, 31*s.* 6*d.*, Macmillan; a first-class work for those who wish to go deeply into the subject, and are not afraid of technical terms; it also contains outlines of classification.

"A Manual of Botany, Anatomical and Physiological," by Robert Brown, M.A., F.R.G.S., crown 8vo., many illustrations, 12*s.* 6*d.*; W. Blackwood & Sons.

"Pollen," by M. P. Edgeworth, several hundred cuts, 8vo., 7*s.* 6*d.*; David Bogue.

On systematic botany (description of all the natural orders) Dr. Lindley's "Natural System of Botany," with a complete list of genera and synonyms, but no illustrations, cloth, 18*s.*; Longmans.

Lindley's "Vegetable Kingdom," a large 8vo. volume with very numerous and good illustrations and excellent index; a work containing a vast amount of information (price unknown to me).

For those who wish to master the art of description nothing can be better than Dr. Lindley's "Descriptive Botany," 1*s.*, with illustration; Bradbury & Co.

On Cryptogamic Botany one of the best works is Berkeley's "Introduction;" 21*s.*; Baillière & Co.

"Introduction to the Study of Palæontological Botany," demy 8vo., illustrated with four plates and 100 woodcuts, by Professor Balfour, 7*s.* 6*d.*; A. & C. Black.

Having mastered the principles of botany we proceed to collect British plants and determine their species. All the following contain the flowering plants and ferns only. Sowerby's "English Botany,"

* Any of the books referred to in this article may be obtained from Mr. David Bogue, 3 St. Martin's Place, Trafalgar Square, W.C.

in eleven volumes, £22 8*s*., in cloth £24 12*s*., half-morocco, £28 3*s*. 6*d*., whole morocco, is the greatest work, containing life-size illustrations, beautifully coloured, of every species, with descriptions. It is so costly that few will buy it, but it can be borrowed from any Public Library, and here I cannot do better than advise learners to borrow from a library books they wish to read (not merely keep for reference) one being ashamed to return them unread, whereas if one buys them they are stored up untouched or unfinished.

A rather cheaper work is "The Flowering Plants, Grasses and Ferns of Great Britain," by Anne Pratt, with more than 300 coloured plates, medium 8vo., cloth, gilt edges, £3 13*s*. 6*d*., F. Warne & Co.; but for beginners the clearest and best work of the kind is the "Handbook of the British Flora," by Geo. Bentham, F.R.S., P.L.S., in two vols., 8vo., together 1062 pages with illustrations (each about 2¼ by 1½ inch) of every species (1295 in all) with 51 pages. Outlines of Botany at the beginning and good index, Lovell Reeve & Co., £3 10*s*.; now to be obtained at a reduced price. Those who wish for one book only cannot do better than *buy* this, recommended by Professors Oliver and Stanley Jevons, and excellent as a work of reference. With a little patience no one *can* fail to discover the name of a plant by its means.

The most portable "Flora" is Hayward's "Botanist's Pocket-Book" containing botanical and common name, soil, situation, growth and seasons, limp cover, 4*s*. 6*d*., no illustrations and very short descriptions; G. Bell & Sons.

More strictly scientific than the two last, and much more complete than "Hayward's," is, Hooker's "Student's Flora of the British Islands," crown 8vo., 10*s*. 6*d*.; Macmillan. No illustrations. Owing perhaps to prejudice, it does not seem to me so easy to determine species by its aid as by Bentham's.

Dr. Lindley's "Synopsis of the British Flora," no figures, foolscap 8vo., 6*s*.; Longmans.

Those who delight in numerous species may buy Prof. Babington's "Manual of British Botany," no illustrations, 12mo., 10*s*. 6*d*., Sixth edition, Van Voorst; and lovers of the Linnæan system, Withering's "British Botany," 10*s*. 6*d*., 155 figures, Scott, Webster, & Geary—only, I am afraid, to be had secondhand, as no one thinks of teaching the Linnæan system, although easier and perhaps better for this particular purpose only.

Works paying special attention to the uses of plants are "Botany," by Prof. Robert Bentley, F.L.S., with 1138 engravings, 14*s*., Third edition, J. & A. Churchill, a good manual of Botany in general. Dr. Pereira's "Elements of Materia Medica and Therapeutics," a very celebrated book, 75*s*., Longmans. Barton & Castle's "British Flora Medica," 1 vol., 8vo., more than 200 figures coloured by hand, revised by J. Jackson, A.L.S., 30*s*.; Longmans. "Popular Economic Botany," by T. C. Archer, 20 well-coloured and excellent plates, 7*s*. 6*d*., Routledge; gives little description of the plants themselves, but can be understood by any one, botanical or not.

On Botanical Geography cheap works are: "Popular Geography of Plants," edited by Dr. Daubeny, 20 plates coloured (but not worth much), 7*s*. 6*d*. Routledge & Henfrey's "Vegetation of Europe," foolscap, 8vo. 5*s*., with map, but no illustrations; Van Voorst.

N.B.—Information respecting any really good works of an inexpensive character which have been omitted above is solicited, in order that they may be mentioned in the concluding part of this paper.

Tapton Elms, Sheffield.

(*To be continued.*)

MICROSCOPY.

CELLS FOR DRY OBJECTS.—At a recent meeting of the Manchester Science Association a new method of preparing cells for dry microscopic objects was described and illustrated. A ring of shellac having been traced upon the slide, a piece of paper was placed upon it. Having been allowed to dry, the cell was cut out of the paper by means of the turntable and a sharp knife. The rings produced by this method are very narrow, but extremely neat; the writer saw the palate of a mollusc mounted in this way.—*Mancestrian.*

EUGLENA (?) VIRIDIS AND ITS BULBED FLAGELLUM.—It is with pleasure that I supply the information desired by Mr. Robson in last month's SCIENCE-GOSSIP. Every specimen of the Euglena that I have hitherto examined has been furnished with the bulbed flagellum, irrespective of the locality whence it was obtained. Indeed, the fact that Mr. Robson has seen

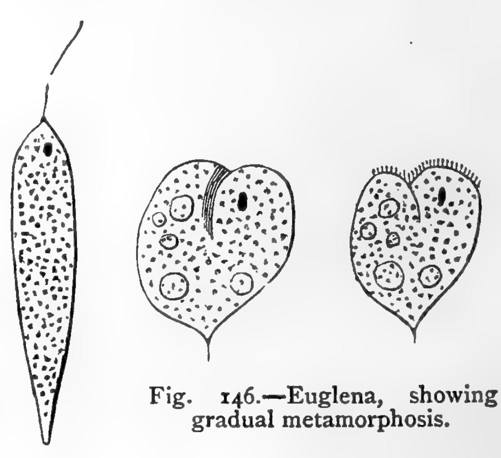


Fig. 146.—Euglena, showing gradual metamorphosis.

them at Newcastle-upon-Tyne, and that I find a quantity of them in the neighbourhood of Preston, seems to indicate that they are not confined to any special locality; at least in so far as the bulbed flagellum is concerned. The Euglenæ, however, are not to be found in every stagnant pond: I examined, recently, samples of water drawn from four different pools without discovering a single Euglena. Your correspondent's theory of the metamorphosis mentioned by

me in my last letter, is certainly ingenious, but is scarcely satisfactory in all points. In my "gathering" the most searching scrutiny failed to reveal the presence of the funnel rotifer in the first instance. Neither was there any other sufficiently large to attack the full-grown Euglenæ with which the water teemed. These gradually disappeared until scarcely more than one could be drawn from the vessel containing the water, whilst a whole army of funnel rotifers were sporting away their short life. My suspicion is, at present, that these bulbed Euglenæ will ultimately prove to be the larvæ of *Hydratina lenta*, or common funnel rotifer. I enclose a rough pencil sketch of three forms of the Euglena observed by me. At the first, No. 1 was the shape of most of those I gathered; these subsequently became fewer, and No. 2 was then the predominating form. A short time afterwards, the flagellum of the No. 2 disappeared, and a wreath of very delicate cilia (No. 3) was clearly discernible. [The objective used by me is a Beck $\frac{1}{4}$in. with No. 3 eyepiece, giving an enlargement of nearly seven hundred diameters.]—*F. Jas. George, Chorley, Lanc.*

How to Make a Compressorium.—Cut a couple of pieces of wood the size of a glass slide, with two small arms projecting from the middle on each side,

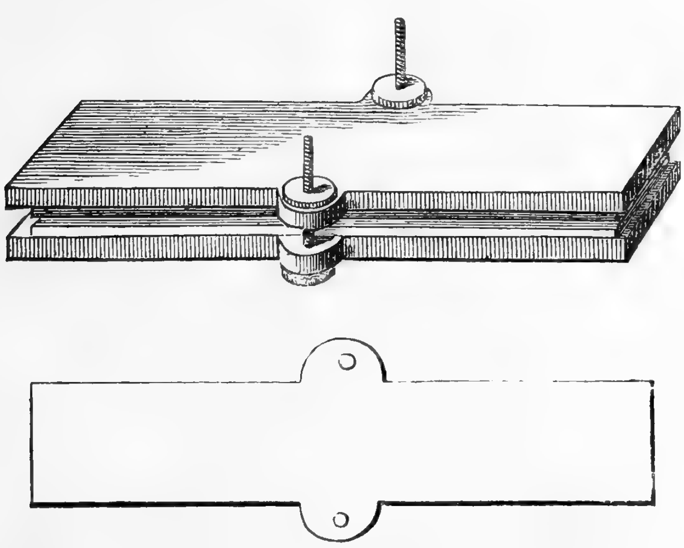


Fig. 147.—Sketch showing details of Compressorium.

with a hole bored through each. Get two screw paper-binders, the largest size: and some glass slides. The object to be compressed is placed between the two glass slides; these are placed between the pieces of wood, and the whole screwed together with the binders which pass through the whole. The only caution needed is to place the holes sufficiently near the edge to admit of the ring of the binder standing out beyond it. Any number of slides, and therefore of objects, can be put in it, and the pressure regulated on either side without moving the object. The outside may be of brass lined with baize.—*H. Field, Blackett, Cambridge Mission, Delhi.*

ZOOLOGY.

Birds in London.—To lovers of nature compelled to spend the best part of the year in London, it is very pleasant to get a glimpse, however occasional, of the birds, and I think their appearance is not so exceptional as might at first be imagined, for during the three years I have been living on and off in London, I have seen as many as twenty-four species. The inevitable house sparrow of course would head the list as regards frequency of occurrence; starlings and rooks are tolerably common; and I have once or twice seen jackdaws. Blackbirds and song thrushes may be seen in all the parks; the missel-thrush is rather rarer; and during the late severe winter I once saw a redwing thrush so busily searching for something eatable on the frost-bound earth that I was able to approach within a couple of yards of it. Of the warbler family I have seen the white-throat-hedgewarbler, the robin, the wren, the willow warbler, and on one occasion the blackcap. The linnet and the chaffinch, the skylark, the pied wagtail, the blue tit, are, as far as I have observed, the only London representatives of their respective families. In Battersea Park a happy little family of moorhens may be seen. I have once or twice noticed the common gull, once, the tern, flying over the river between Vauxhall and Chelsea Bridges, and on one occasion I have seen the great black-backed gull flying slowly down the river, near Lambeth Bridge. Swallows are sometimes to be seen, especially in Battersea Park; twice lately I have seen swifts circling about, on one occasion over the Horse Guards, on the other over the river near Chelsea Bridge. I should be inclined to attribute their appearance to their having had to extend their hunting grounds, on account of insect life being comparatively scarce, by reason of the long-continued unfavourable weather.—*W. H. Legge.*

Influence of the Wet Season on Butterflies.—Not for several years have I observed the summer brood or flight of butterflies (the emergence of which usually occurs about the end of May or the beginning of June) to be so deficient in numbers. The species that have suffered most from the unfavourable spring are those which are single brooded, and confined to a special habitat. In some of these, we may suspect there will be even more scarceness noticeable in 1880, through the deficiency of parents this year. Thus, take such an example as some Fritillary furnishes, say *Argynnis Euphrosyne.* If some wood in which it breeds furnishes in average years a thousand perfect insects, and this year only two or three hundred came out, owing to the death of many larvæ, the number of eggs deposited will perhaps be 25 per cent. less than in 1878. We can easily understand how it is that some species disappear for long periods, or die out, when they had had to endure a succession of unpropitious seasons.—*J. R. S. C.*

The British Association meets at Sheffield on Wednesday, August 20, under the presidency of Professor Allman. The contiguity of Sheffield to the Peak district makes that town peculiarly desirable for a meeting of this sort, in which excursions form one of the most attractive part of the week's programme. Among other places to which excursions are appointed are Chatsworth, Thoresby, Darley Dale, Stanton-in-Peak, Arbor Lowe, &c.

The Popular Science Review.—The July number of this most valuable and ably-edited quarterly is one of the best and strongest we have had for some time. It contains the following articles: "Facts and thoughts about light-emitting animals," by Professor Duncan, F.R.S.: "The life, birth, and death of a storm," by Robert H. Scott, F.R.S.: "On the extinct animals of the Colonies of Great Britain," by Professor Owen, F.R.S.: "Is nest-building an instinct in birds?" by B. T. Lowne, F.L.S.: and "The position of the Silurian, Devonian, and Carboniferous rocks in the London area," by Robert Etheridge, F.R.S.

Capture of a Whale in Lough Foyle.—It may interest some of your readers to hear that early in June a male of the species known as Sibbald's Rorqual (*Balænoptera Sibbaldii*) was captured in this locality. I readily identified it by the description given by Mr. Thomas Southwell, F.Z.S., in Science-Gossip a short time ago. It was injured by coming into collision near the entrance to the lough with a steamer bound for Londonderry. During the day it was observed spouting opposite Moville, and was at once pursued by a large number of people in boats, who by firing, and otherwise frightening it, succeeded in driving it into shallow water, where it was soon left stranded by the receding tide. It was auctioned by order of the Receiver of Wreck, and purchased for £18 by a local gentleman, who has had the blubber removed and boiled down. Its length was about sixty-two feet. Two years ago a grampus in an advanced stage of decomposition was washed ashore at Termone in this neighbourhood.—*John Anderson, Moville.*

Occurrence of Lophinus palmatus near Eastbourne.—I recently found four males and two females of this species near here, and as Sussex is not mentioned as a habitat by Cooke in his "British Reptiles," I thought it might interest other readers of Science-Gossip to know that they do occur here. I may add that I do not find them as hardy as the other British newts, both of which are also to be found in this neighbourhood.—*Charles Foran.*

The Manatee.—At a recent meeting of the Zoological Society, Dr. J. Murie read a paper on the Manatee, containing the results of his examination of the specimen which was lately living in the West-minster Aquarium. The peculiar attitudes assumed by the animal in life, the great mobility of the upper lip, and the occasional use of the limbs in feeding were noted. As regards the anatomy, the chief points dwelt on were the shape of the brain and its suppressed convolutions. The vexed question of the number of the cervical nerves and their distribution was also discussed.

The Nightingale.—It would be interesting to receive well-verified notes on the latest date up to which (perhaps on account of the delayed summer) the nightingale's song has been heard this year. I heard the bird in full song about four o'clock on the afternoon of July 2nd—the latest date I remember to have heard of.—*J. E. Taylor.*

BOTANY.

Abnormal Development of Cardamine pratensis.—In the chapter on Heterotaxy of Dr. Masters' work on "Vegetable Teratology," is an account of an abnormal development in *Cardamine pratensis* quoted from Bromfield's "Flora Vectensis." A form of *Cardamine pratensis*, somewhat similar to that described, has been growing in a field in the parish of Widford near Chelmsford for many years. It was first observed by me in 1859, and is to be found there to this day; which seems to prove that, monstrous as it is, it may be regarded as a permanent variety. The flower opens first like any other of the same species, sepals, petals, and stamens occupying their proper places and falling as in cruciferous plants they commonly do. Then the ovary acquires a stalk and swells into a flower-bud, which finally opens into a second flower that is perfectly double, like that of a double stock or wallflower. When transplanted into a garden, the plant retains its character and may be readily propagated by division, so that if it gain favour with botanists or amateur gardeners it may become as common as anybody could wish it to be.—*John Gibbs.*

Fly-catching Plants.—My attention has been directed to an interesting passage in which the carnivorous properties of the Drosera (sun-dew) are affirmed, though I believe the discovery that the plant not only catches, but *digests*, and is nourished by insects, is also, and mainly, due to the independent researches of Dr. Darwin. The passage occurs in a note on p. 13 of a small book entitled "Arran; a poem in six Cantos." By the Rev. David Landsborough, Minister of Stevenston, Ayrshire (Edinburgh, W. Blackwood, 1828). The author writes:

> "Should a fly
> Rashly presume to sip the sparkling dew,
> Or leaflet fresh to crop, she dies the death.
> The viscous dew soon clogs her wings and feet;
> And soon her mouldering form strengthens the plant,
> Which thus, when persecuted, better thrives."

To this the following note is appended: "What I have said respecting the sun-dew being nourished

by the dead bodies of the flies which it entangles, *is a theory of my own*, in so far as it relates to the sun-dew, but I have little doubt that it is a correct one." He adds that Sir J. E. Smith was aware that the American plant *Dionæa muscipula* is "to a certain extent nourished by the insects which it catches." The "viscous dew" of the Drosera is simply vegetable pepsine. The author made one curious mistake respecting it, that he supposed its purpose was "to prevent small insects from infesting the leaves." It is more likely that they are attracted by it, as the aphis is by the "honey-dew" on the leaves of the lime-tree. One of the best examples of a fly-trap is furnished by *Arum maculatum.* If the spathe is cut open, the ball at the lower part will generally be found full of flies. They creep in, attracted by the strong scent of the spadix, and are prevented from returning by the fringe of deflexed hairs which fill the constricted part, or neck of the spathe.—*F. A. Paley.*

CARDAMINE AND MATTHIOLA.—It may interest your readers to hear that a quantity of the common cuckoo flower (*Cardamine pratensis*) has been found growing double near Chichester, in a paddock adjoining Mundham House, the residence of Mr. Hillier, who has kindly forwarded me several fine plants, a specimen of which I enclose. When staying near Freshwater a week or two ago, I gathered some enormous specimens of *Orchis morio* near the fort at Colwell Bay; some of the flowers are deep purple, others salmon colour, some pure white, destitute of spots; the flowers were so thickly crowded together all round the stem, that I had to pick many off before I could succeed in drying a specimen. Dr. Bromfield, in his "Flora Vectensis," states that the Morio is scentless; these were, however, very fragrant, in fact, so overpowering was the scent I had to turn them out of my room. I may also add that the cliffs from Freshwater Gate to Compton Bay, a distance of about two miles, abounded with remarkably fine plants of *Matthiola incana*—most of which, however, were growing in inaccessible places. The flowers were much darker and smaller than those I gathered last year at Ventnor, and the plants much more bushy. As Freshwater is supposed to be its only *boná fide* habitat in a wild state, it is satisfactory to know that there is thus no danger of its being extirpated.—*F. A. Brent, Pellhurst Villa, Ryde.*

MONSTROSITY OF GEUM RIVALE.—Allow me to draw attention to a monstrosity of *Geum rivale.* The plant grew by the side of a brook. It was about eighteen inches high, with several flowers, each having the following peculiarities, more or less developed according to the æstivation of each flower. Instead of drooping (as is usually the case), each flower stood erect; the calyx consisted of five unequal sepals, having all the appearance of true leaves, with five minute brown sepals alternating with the larger ones. Of the corolla nothing can be said, only that it was double, each petal being of the usual form and colour. The stamens were much less in number than in an ordinary specimen. The carpels formed the usual globular head, but instead of being on the same level as the stamens, were borne on an elongation of the pedicel, which passed through the centre of the flower, so that they were situated fully two inches above the other parts. At their base were five lanceolate green bracts.—*J. T. C. Williams.*

SCIENCE-GOSSIP BOTANICAL EXCHANGE CLUB.—We are glad to be able to inform our members that we have a large parcel of excellently-dried specimens of British Rubi, all localised, and best of all, they are all trustworthy examples of this intricate genus. We hope this valuable gift will bring us many more members; a parcel will also be sent to those who, although unable to contribute specimens for the year's distribution, send the London Catalogue with the nominal subscription.

SHOWER OF POLLEN.—Being at Windsor on Sunday, June 8, my attention was taken by a yellowish scum floating on the surface of the puddles during a sharp shower about 6 P.M. On putting it under the microscope it turns out to be pollen of some kind: see sketch at three hundred diameters. Is it the

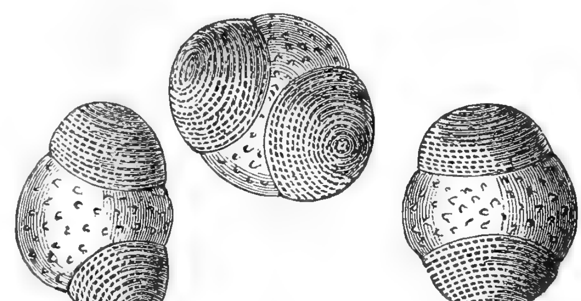


Fig. 148.—Magnified pollen-grains which fell in the "Pollen-shower."

Pinus australis mentioned by your correspondent in p. 138? The fall was pretty general, having been noticed at Eton, Slough, and Frogmore; has any one else noticed it?—*H. G. Wheeler.*

VEGETABLE "COMMENSALISM." — I wonder whether botanists will ultimately discover that certain plants are "commensal," as well as certain animals such as Professor van Beneden has told us of in his "Animal Messmates." For several years past, I have been particularly struck by the occurrence in the eastern counties of the Yellow-wort (*Chlora perfoliata*) so constantly in company with the Bee-orchis (*Ophrys apifera*), that when I have found one plant I have almost instinctively looked for the other. Has this association been noted elsewhere? It seems possible to imagine that flowers generally obscure should reap some advantage by growing in the neighbourhood of more attractive

kinds (although the bright yellow-wort hardly needs to associate with the Bee-orchis on that account), just as you see little confectioners' booths springing up by the side of some itinerant circus, in order to profit by the greater attraction of the noisy exhibition. Again, I conceive it possible that other flowers may be advantaged in quite a different way, by growing in company with plants possessing some poisonous stinging,' or other defensive property. Thus, it is noticeable how certain kinds of umbelliferous flowers are always found growing in the midst of dense patches of nettles, or amid the thorny brambles and hedge-rows. Have any of our botanical readers noticed anything approaching such a "commensalism" as is here suggested?—*J. E. Taylor.*

GEOLOGY.

Further Discoveries in the Cresswell Caves.—Professor Boyd Dawkins and the Rev. J. M. Mello, F.G.S., have communicated to the Geological Society an account of digging-operations carried on in one of the smaller caves of the Cresswell Crags, known as Mother Grundy's Parlour. They described the occurrence in the red clay and ferruginous sand of this cave of bones of hippopotamus and the Leptorhine Rhinoceros, proving the existence of these animals in the wooded valleys of the basin of the Upper Trent at the time of the accumulation of those deposits; while at the same time, so far as the evidence goes, there was an absence of Palæolithic man, of the reindeer, and of horses, while hyænas were abundant. In a subsequent period, represented in all the caves by the red sand, the mammoth, woolly rhinoceros, the horse, and reindeer inhabited the vicinity, and were subject to the attacks both of hyænas and of human hunters, whose quartzite implements prove them to belong to the same people whose traces are found in the river-deposits. In the breccia and upper cave-earth of the larger caves the existence of the Palæolithic hunter is evidenced by flint implements, resembling those of Solutré, accompanied by implements of bone and antler. Associated with these was the incised figure of a horse described in a former paper. The authors finally dwelt briefly upon the characteristics of the caves in prehistoric and historic times, and indicated some of the anthropological points of interest connected therewith.

Dr. Gwyn Jeffreys has communicated to the Zoological Society the second part of his work on the Mollusca of the *Lightning* and *Porcupine* expeditions, embracing the families from Anomiidæ to Arcidæ. The number of species noticed was 100, of which 4 were new to science, and 15 were hitherto unfigured. Particulars were given of the geographical and geological distribution of all the species, and their synonymy was discussed. Some species of Leda and Malletia were Sicilian fossils of the Pliocene formation, and had not been previously known as recent or living. These species occurred at great depths, a fact which showed that the sea-bed in that part of the Mediterranean had been considerably raised since the Tertiary epoch.

Faults in the London Clay.—Dr. J. E. Taylor has forwarded to the "Geological Magazine" an account of nine faults or dislocations seen in the newly-made sections of the London clay near Harwich, which have been laid bare by the excavations for the construction of the new docks. These "faults" are as plainly visible as in a geological diagram, and the most important of them indicated a vertical dislocation of more than twelve feet. With one exception, the faults dipped at an angle of about fifty degrees.

A Mammaliferous Deposit at Barrington, near Cambridge.—The Rev. O. Fisher, F.G.S., has just communicated a note to the Geological Society on this subject. The gravel in which the remains were found is about twenty feet above the alluvial flat by the river Rhee, and is evidently post-glacial. The gravel contains some of the ordinary land and fresh-water shells, but not *Cyrena* or *Unio*. Remains of the following mammalia have been found: *Ursus spelæus*, *Meles taxus*, *Hyæna spelæa*, *Felis spelæa*, *Cervus megaceros*, *elaphus*, and another, *Bos primigenius*, *Bison priscus*, *Hippopotamus major*, *Rhinoceros leptorhinus*, *Elephas antiquus* and *primigenius*, with a worked flint, almost certainly from the same deposit. Mr. Fisher considers the abundance and admixture of these remains due to the locality having been a sort of eddy or pool in the old river.

Viviparous Ichthyosauria.—At the last meeting of the Geological Society, a paper on the evidence that certain species of *Ichthyosaurus* were viviparous was read by Professor Seeley. The author described certain specimens of Ichthyosaurs in which the remains of one or more small individuals have been preserved within the body-cavity of larger ones. One was noticed in 1846 by Dr. Chaning-Pearce, who suggested that it furnished evidence in favour of the viviparity of the Ichthyosaurs. Other examples are preserved in museums in Germany, and one in Madrid, and most of them have been examined by the author, who adduces the state of preservation of the small individuals, in contrast with that of the traces of fish and Cephalopoda, the remains of food, which are found in the stomachal region of the larger individuals, in advance of the position occupied by the smaller ones, as a proof that we have not here to do with a case of cannibalism. The position of the smaller skeletons, with the head generally turned towards the pelvic region of the larger ones, is also regarded as indicative of their standing in the relation of parent and offspring. As some of the young specimens possess limbs, it would seem that the supposition that *Ichthyosaurus* passed through a sort of tadpole stage is erroneous.

SAMUEL WOODWARD, THE NORFOLK GEOLOGIST.—In these days, when it has become fashionable to glorify naturalists in humble life, we are glad to see that Mr. H. B. Woodward has contributed to the Norfolk and Norwich Naturalists' Society a "Memoir of Samuel Woodward." This veteran geologist and antiquary, who so enthusiastically worked at the geology of Norfolk fifty years ago, when there were plenty of suspicions and social persecutions prepared for those who dared to follow the "stony science," was the honoured father of "the Woodwards," who have done so much for palæontology, and the grandfather of the writer of this capital and much required memoir, himself a young geologist, who has already "won his spurs."

THE GEOLOGICAL SURVEY AND ITS RELATIONS TO AGRICULTURE.—We are glad to see that Mr. F. J. Bennett, F.G.S., has reprinted the address on the above subject, recently delivered before the Ixworth Farmers' Club, in the pamphlet form. It is a well-considered essay, and should be read by all those interested in agriculture.

FOSSILS AT FOLKESTONE.—While spending a short holiday at Folkestone, I enjoyed a very pleasant time in searching for fossils in the gault, and found the following specimens very abundant:—*Ammonites tuberculatus*, *A. splendens*, *Inoceramus sulcatus*, *I. concentricus*, *Hamites*, *Nucula pectinata*, *Belemnites Listera*, *Rostellaria*, and many other rare but at present unnamed specimens. I write this to encourage any fond of collecting fossils to give Folkestone a trial. There is a small local museum and a capital free reading-room. On the Warren may be found many rare species of plants, and in the chalk there are also many interesting objects for the microscopist.—*E. E.*

LOCALITIES FOR FOSSIL STARFISH.—Permit me to add a note to the reference to Leintwardine in your article (No. VII) on "Common British Fossils." *Imprimis*, that village is nine (not six) miles from Ludlow. The only locality where the starfish have been found was a quarry on the top of Church Hill; but the stratum, or band, in which they occurred was very thin; about 9 inches, if I remember rightly; and it has been worked out as far as it could, without encroaching on the fields. There is a large quarry on Mocktree Hill, where the Lower Ludlow beds join the Aymestry limestone, but only a small trace of the starfish band has been found there.—*E. B. Kemp Welch.*

LOCALITIES FOR FOSSIL STARFISH.—As you have invited your geological correspondents to inform you of localities where fossil starfish have been found, I have much pleasure in placing upon record a quarry at Rumney, about two miles from Cardiff, as a locality where I have been fortunate enough to discover one of *Palæaster*. The fossil is well preserved in a fine grained yellowish sandstone belonging to the Upper Silurian. I have only found this one specimen, nor have I heard of other searchers being so fortunate as myself, but I have no doubt careful searching would be rewarded.—*W. H. Harris.*

LOCALITIES FOR FOSSIL STARFISH, &C.—In your last article on "Common British Fossils," &c., (one of a series which I am very glad to see recommenced, and which I have read with much interest) you ask for information concerning "any fossil starfish locality." In the upper greensand beds of Blackdown, in my immediate neighbourhood, starfish have been found. Two such specimens are to be seen in the Bristol Museum. They are, I think, unnamed, but they are in good preservation. The matrix in each case is a half prepared whetstone, for which article the Blackdown beds have been extensively quarried. The workmen tell me of several such finds, which they have sold to private collectors. They describe them as being "like a cart-wheel," a description not accurate enough to warrant me in saying whether they belong to the asteroid or ophiuroid order, though those in the Bristol Museum, unless my memory greatly misleads me, belong to the former. Starfish are by no means common in the Blackdown beds, nor have I ever myself found them there.—*W. Downes.*

NOTES AND QUERIES.

INTELLIGENCE IN MAN AND ANIMALS.—Mr. A. C. Rogers has retorted on me that my remarks on this subject in your May number are more poetical than scientific. I admit this, and my excuse is simply that I considered the scientific part of this good-natured "gossip" was safe in the hands of himself and Messrs. Barclay, Wheatley, and Co., but thought the impressions the correspondence had given to an outsider, and a reminder of what some intellectual (though I admit unscientific) minds had thought on the subject, would not be out of place. Will you kindly allow me now to mention what seems to me difficult to understand in Mr. Wheatley's last letter. He points out that monkeys, among other wonderful things, listen to speeches from their leaders, and attributes the reasoning power of man in part to language. How is it that with this power of speech in monkeys, added to all their wonderful primal impulses (which Mr. Barclay mentions, and which cannot be denied, and which enable them to act so reasonably according to the necessities of their existence) they have not, and apparently never will formulate the first rudiments of the science of language; and if they have a language sufficient to "speechify" for a long time, how do they get it without having in some way formulated it; except, as Mr. Barclay says, from primal impulse? It appears to me that the difference in monkeys and men cannot in this respect be attributed to the many thousands of years Mr. Wheatley speaks of, in which man had the opportunity of developing his powers, for I have yet to learn that man appeared on the scene before

monkeys. We are told that monkeys occasionally "execute careless sentinels," thus (if we judge of them by comparison with our own thoughts and motives) they have a conception of retributive justice; the carrying out of conception denotes contemplation, mental conception and contemplation denotes mind—but as Mr. Barclay (I think) has put it, are we sure we are safe in so judging? Let it be proved that a monkey's idea of capital punishment comes from the same kind of reasoning as that of man, that it is acquired in the same manner, then I can believe that monkeys have mind; but let it be proved (and the thing seems to me to be self-evident) that it is not so acquired, and that probably it comes from the pure instinct of revenge, then I can only believe that however "reasonable" the actions may appear, they are the result of primal impulse. Mr. Rogers says he cannot see how memory can exist without reason, nor reason without memory. Is not the difficulty rather how *instinct* can possibly exist without memory, its necessary incident? What would be the use of an instinct of locality unless an animal remembered the particular locality its instinct prompted it to find? What would be the use of its instinct of appetite without the memory to know where it had found food and thence where to look for it? What would be the use of the instinct to avoid pain unless the animal remembered what gave it pain? What would be the use of the instinct of the dog to become attached to its master unless through the instinct of scent or otherwise it remembered its master, and so on in all cases of instinct? Without memory in these cases the instinct could not and would not exist. It may be said so it is with mind; without memory that would have no existence, but it by no means makes the two faculties (mind and instinct) alike. The difference seems to me to consist in this, man is able to remember and to think, and from *thought* to act independently of primal impulse. Animals are able to remember, and from *memory* to act in accordance with some given primal impulse. The one constitutes mind, the other instinct. So far as either faculty depends upon memory for its development or completion, it differs only in degree from the other. So far as the one does not depend, and the other does depend for its development or completion upon primal impulse, they differ in kind, the one stamping the creature as an intellectual, the other an unintellectual being—at least, such is my idea.—*Idea.*

Intelligence in Man and Animals.—The little discussion on the above subject, now appearing in Science-Gossip, is in danger of becoming confused, unless the several disputants at once define clearly and precisely what they mean by the terms "instinct" and "reason." Exact definitions are at all times valuable; but in the present instance they are absolutely necessary, to show the points of agreement and of difference subsisting between the parties to the discussion. How far is an "instinctive" act automatic, and how far is it the outcome of volition? I have long held the opinion, that what is termed instinct, is identical in essence with what we call reason; and that this peculiar "faculty" is possessed, in some degree, by all animal organisms at least. Whether any sections of the vegetable kingdom are similarly endowed, I do not pretend to say; but certainly, the actions of some of them are remarkable. I shall watch the progress of the discussion with great interest.—*F. James George.*

Intelligence in Man and Animals.—There were two or three misprints in my letter of June, which, as they alter the sense, I should be greatly obliged if you would grant me a line to correct. They are as follows: For "concise proposition," read "converse proposition." For "law of reason," read "supposed law of reversion."—*H. D. Barclay.*

Devotion of a Dog to a Cat.—When staying near Lausanne this spring, I met some Swiss friends of my host's, who told us a remarkable instance of attachment on the part of their Saint Bernard dog to a kitten. Their next door neighbours threw some newly-born kittens over the garden wall that the dog might make away with them. He caught and bit one kitten as intended, and one was killed by the fall. Bernard now seems to have undergone a revulsion of feeling, for the two remaining kittens became the objects of his attention and care. Carrying them off in his mouth to his kennel he tried to revive them by licking and warming them. One soon died, but the other responded to the care bestowed on it by its huge nurse, which was supplemented by the kindness and feeding of Bernard's owners. It throve in its kennel home, where the pair were constantly to be seen together, the soft little black cat lying cuddled in Bernard's protecting arm, whence its bright eyes peeped out at passers-by. Pussy returned the dog's good-nature by the devotions of a daughter, and when in the course of time she became the proud mother of a family, she was impatient to introduce her kittens and adopted father. Mewing and skipping before him she conducted Bernard from his kennel to her cosy nest, rolling over and over with delight on the grass near, while he solemnly inspected his favourite's family; thus showing the strongest proof possible in an animal of confidence and affection, and one certainly at variance with the instincts usual in cats towards dogs. The regard which existed between the two friends lasted through life; what is very remarkable is that Monsieur Gaulis says Bernard, ever after his adoption of the kittens, showed the greatest disinclination to hunt any black cat.—*D. Hoskyns.*

Shrew Mice (*Sorex araneus*).—Rambling in June last on the Welsh hills, on and around a block of millstone grit rock, I noticed the remains of a great number of shrew mice. The rock was situated at the top of a mountain, the highest ground in the district. The remains consisted of the heads and hinder quarters of at least thirty animals all in various states of decay. The heads appeared to have been severed from the body very much in the same place; indeed, so much so that one might almost have imagined the bodies to have been placed in a line and then to have had their heads cut off with a knife. The hind quarters were also severed precisely in the same manner above the hind legs. I also noticed that the livers had also been carefully rejected, and a few, quite fresh, were still sticking to the rock. I concluded the shrews must have been brought there by some bird of prey. Taking into consideration the fact of the rock being lofty and more or less isolated, I thought the bird might possibly have been a kestrel (*Falco peregrinus*). Being unable, however, to find the remains of birds or other animals, I was led to suppose it might be an owl. Can any of your readers inform me if either of these birds or any others are in the habit of choosing one particular spot whereon to eat their food? And also as to their having eaten it so daintily?—*A. A.*

How to destroy Beetles.—Can any of your readers inform me the best plan to get rid of the *Otiorynchus sulcatus* (or Picipes), which does great damage to raspberry plants?—*W. Roberts*, 9 *Chapel Street*, *Penzance.*

STURGEON AT MAIDSTONE.—I saw a splendid royal sturgeon shot to-day while endeavouring to pass over the locks here. I suppose it came up during the floods we have had lately. The fish was shot by Messrs. Whiteman and Russell, and measured 7 ft. 9 in. in length, weighing 148 lb. It is a very unusual occurrence here.—*R. F. Osborne.*

BIRDS AND FRUIT.—Mr. G. J. Lowe, of the Highfield House Observatory, says: "No birds or birds' nests have been destroyed here for many years, and yet we have fruit. No doubt the birds help themselves (as wages), but without their labours there would be no fruit for anyone. Several times birds have saved me a crop of apples. On one occasion an examination of hundreds of bunches of blooms disclosed caterpillars feeding in every bunch; next day the birds had found them, and in a few hours there was not a caterpillar to be seen. A grass field here was so infested with the grub of the cockchafer, that the grass could be rolled up; soon the birds began their work, and the grubs vanished. Some years ago the farmers killed all the rooks in a particular district, and the crops in consequence were destroyed by grubs, and it was only on the reintroduction of these birds (at a great cost to the farmers) that good crops were again obtained. Thirty-five years ago a nurseryman left here for Australia, taking with him all our popular hardy fruits and vegetables, but the produce was yearly destroyed until the English sparrow was introduced, after which there was plenty of fruit."

Waterton calculated that a single pair of sparrows destroyed as many grubs in one day as would have eaten up half an acre of corn in a week, and that instead of giving a reward of sixpence a dozen for dead sparrows, more would have been gained by paying many times as much to preserve them from injury.

PIKE TAKING TENCH.—I am afraid that Mr. John H. Keene's assertion that the pike, be he ever so hungry, never takes a tench *is*, as he says, "too pretty to be true." On June 4th, fishing in a canal reservoir in Shropshire, I caught a jack of ten pounds' weight with a small tench as a bait. The exact spot where this fish was taken had the same day been trolled over by a friend and myself, using respectively a gudgeon, and a perch. We may therefore reasonably presume that "Esox" prefers a tench as a dainty morsel to either of these fishes. Moreover, my friend, than whom a more successful angler for pike does not exist, tells me that he prefers a tench as a bait for pike to almost any other kind of fish.—*W. B. N., Asefield.*

INSECT-BLIGHTS.—Will you allow me to make inquiry through your columns as to the title of any book or books which will give some general information on the very interesting subject of insect-blights, aphides, or plant-lice? I have the "Letters of Rusticus," which little volume, so far as it goes, is admirable: but what Mr. Newman has done for the gooseberry-grub, the hop-fly, and the turnip-fly, I do not doubt has been done by some author (if I only knew his name) for the innumerable species of fly or aphis, which in some form or other, infests (I believe) almost every plant. I think that some such inquiry as this was made a year or two back in the pages of SCIENCE-GOSSIP, by some other correspondent, but elicited no reply. I trust, however, that I may be more fortunate, and shall be truly grateful if any of your Entomological readers will help to enlighten my ignorance on this interesting subject, by guiding me to the right channel for information.—*Alfred Charles Smith, Yatesbury Rectory, Calne.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

CAREX (Fishbourne).—There cannot be any doubt about its being *C. panicea* (L.). The list for Exchange Club stands as last year. We should imagine the three carices could still be gathered; two at least have been recorded recently in Ireland.

G. C. (Highfield).—They are too young to decide with certainty; we believe they are 1. *Carex panicea*; 2. *C. stricta*; 3. *C. ampullacea*; 4. *C. muricata*; 5. *C. ovalis*; 6. *C. vulpina*. Could you let us see more advanced specimens?

C. E. S. (Jersey).—They are 1. *Asplenium lanceolatum*; 2. The same (we think), but a small stunted frond.

W. J. X. (Ely).—The examples of *Batrachian ranunculi* are, Nos. 1 and 2 *R. trichophyllus* (Chaix); 3. *R. heterophyllus*; 4. *R. heterophyllus*; a variety approaching *R. floribundus*, (Bab.).

B. L. B. S. (Bolton).—We could not tell from a single leaf: no doubt flowers will soon be seen, then let us see it.

O'MEARA (St. Omer).—Thanks for your kind letter; the specimen enclosed was a variety of beech, named in nursery catalogues *Fagus sylvatica laciniata*; the upper part is probably growing out. You will find it explained in "Trees of Old England," by Grindon.

F. L. S.—The beetles are *Ptinus fur*, allied to the Death-watch beetle, and very common in houses.

G. P. JOHNSON.—The insect attacking the wine corks is not a beetle but a small moth, *Œnophila v-flava*. The larvæ are in the corks in May and June. Thoroughly dipping in hot wax, so that the coating reaches the glass, leaving no room for the female moth to get at the substance of the cork to lay her eggs in, would be effectual.

S. J. L'ANSON.—We duly received your very beautiful sketch of *Calla Æthiopica*, showing double spathe. It is a phenomenon of frequent occurrence among the *Araceæ*. Dr. Masters has shown that the presence of an increased number of spathes in *Calla palustris* is associated with the development of a side shoot from the axil of the last leaf, where no shoots usually issue. Your specimen is remarkable for having both spathes on the same level, and evidently of the same size.

B. H.—The Devon and Cornish coasts, and the shores of the Isle of Man, are the best places we know of for collecting coloured sea-weeds. The neighbourhood of Douglas, Isle of Man, is perhaps unequalled in the British Isles.

T. MEARE (Burnley).—Add some used tea-leaves to the soil where your oak-leaved geranium is growing. We do not think the buds will then wither away as you describe.

Z.—As far as we can judge from your outline sketch, the creature is the aquatic larva of a dipterous insect (allied to the crane-flies, or "Daddy Longlegs") called *Corethra plumicornis.*

E. VILES.—The alga found on the carriage drive is *Lyngbya muralis* (Ag.), usually found on the ground in early spring, in all damp situations.

J. W. HARVEY.—Please inform us of the locality and habitat of the sponge you sent to be named last January.

A. SCHREIBER.—We cannot undertake to name sponges from such small portions as those you sent us. The last specimen sent was evidently a species of *Chalonia.*

C. PARKINSON (Ventnor).—The "monstrosity" in the species of *Ranunculus* sent us is due to "fasciation," one of the commonest of vegetable malformations. It is usually met with when an unusual number of buds are formed in close apposition, when they are liable to be compressed during their growth, so that union takes place among the soft tissues.

H. HEINES.—The "monstrous" condition of the specimen of the water-avens *(Geum rivale)* you kindly sent us, was due to medial floral prolification. It is of most common occurrence among pinks. See Masters' "Teratology," p. 119. Could you send us a few more flowers and leaves of the sapindaceous plant you enquired the name of? Many thanks for the interesting malformed specimens of *Arum maculatum.*

R. J. WARD (Lincoln).—Your specimen of *Calceolaria*, showing the three different kinds of malformation of flower, are very interesting.

ROBERT M. CHRISTY.—1. The grub is the caterpillar of a

small moth, *Retinia Buoliana*, one of the family *Tortricidæ*, common wherever pine-trees grow. There are particulars in Loudon's translation of Kollar's "Treatise on Injurious Insects;" and a paper by Westwood on the allied species, *R. turionana*, of similar habits, in the "Gardener's Chronicle" for 1850, No. 44, would also be of interest. Nothing short of cutting off and burning the infected shoots while the grub is in them, could be of any use. 2. As to getting rid of Goat-moths. Picking the larvæ by hand would be easy, as they are so large; it would do little harm to cut away the outer wall of their galleries, if not too deep. Injecting the carbolic acid with a strong syringe would certainly bring them out.

E. DUPREY.—The "dark purple mineral in small veins of syenite" is the violet-coloured variety of fluor spar, which in Derbyshire is found in large nodular masses, and locally denominated "Blue John."

H. D.—Your fungi were so withered and dry when they reached us, through not being properly packed, that it was utterly impossible to make them out.

R. A. BULLEN.—The banana *(Musa sapientum)* belongs to the order Musaceæ. "Brazilian tea" is composed of the leaves of *Stachytarpha jamaicensis*, a member of the Verbenaceæ.

W. H. L.—Your specimens are (1) one of the lime-secreting sea-weeds *(Corallina officinalis)*; (2) a Bryozoan *(Membranipora pilosa)*. The form of "cup-moss" *(C. pixidata)* you mention is not uncommon. Try a little benzine for removing the mould.

C. H. GASTREL.—Thanks for your interesting specimen.

J. A.—We will see to the insects being named in due course. The best book is Rye's "British Beetles," published by L. Reeve & Co., price 10*s*. 6*d*.

E. W. A.—Get Lindsay's "British Lichens." There is a work now issuing on "American Characeæ," but we are not aware of any special work on British species.

T. S. SMITHSON.—Your plant is the white variety of the common milk-wort *(Polygala vulgaris)*. Lindley & Hutton's "Fossil Flora" contains the best figures of coal plants. The chapter on "Coal" in the work just published by Macmillan on that subject, will give you a capital account of the structures and affinities of coal plants.

H. PEARCE.—Botanical mounting paper may be obtained of J. Gardner, 426 Oxford Street. Did you see the advertisement notice of the "Botanist's Portable Collecting Press" in last number of SCIENCE-GOSSIP?

J. A. WHELDON.—Your mosses are: 1. *Polytrichum juniperinum*; 2. *Hypnum cuspidatum*; 3. *Hypnum rutabulum*; 4. *Funaria hygrometrica*; 5. *Leptobryum pyriforme*.

A. P.—Your moss is *Campylopus turfaceus*.

W. E. GREEN.—The mosses sent in are as follows: 1. *Bryum pallens*; 2. *Trichostomum flavo-virens*; 3. *Dichodontium pellucidum*; Bryum (young, probably nutans); 5. *Hypnum confertum*; 6. *H. cupressiforme*, var. resupinatum.—R. B.

M. MEDHURST.—The specimens belong to a species of watermite *(Acarina)*, but they are in too fragmentary a state to tell which species. Could you send us a clean mounted specimen?

EXCHANGES.

FOR leaf of *Elæagnus Japonicus variegata* send other unmounted material; some duplicate slides to exchange.—The Lindens, New Brompton, Kent.

A COLLECTOR, who has some duplicates, will send twenty specimens of rocks and minerals on receipt of fourteen pence; carriage paid to Manchester. Apply to E. Jones, Poplar Grove, Sale, near Manchester.

PREPARED tubes and packets of very interesting material, mostly marine, on approval; exchange in good slides, photo lens, camera telescope, books, &c.—T. McGann, Burren, Ireland.

EGGS of bird parasites, a set of about twenty different kinds, to include those figured in SCIENCE-GOSSIP of June 1, 1870, required in exchange for purely Indian slides, mounted or for unmounted material.—C. Liddell, "Englishman" Office, Calcutta.

WANTED, the following medals:—1st Burmese medal, Cabul, Candahar, distinguished conduct, Hyderabad, Jellalabad (crown), Jellalabad (victory), Chuznee—Cabul, Meeanee, Hyderabad, meritorious service, Meeanee, Pemniar Star, Seringapatam, Victoria Cross. Fossils, minerals, British or foreign shells, or money for the same; state price, to A. J. R. Sclater, Bank Street, Teignmouth.

WANTED, a few fine specimens of crystallised minerals and ores. Offered upwards of a hundred species of British marine shells, from Jersey; some very rare. Lists exchanged.—E. Duprey, Jersey.

SEVEN-GUINEA electric machine for fossils, micro slides, or books on natural history. — W. Tylar, 165 Well Street, Birmingham.

WELL-FINISHED slides offered of *Batrachospermum moniliforme*, *Scytonema myochrous*, *Volvox globator*, *Coleochaete scutata*, various micro-fungi, wood sections, &c., in exchange for the following materials:—cleaned Polycistina, cleaned and named diatoms, or micro-photographs of any kind.—William West, 15 Horton Lane, Bradford.

WANTED, twelve typical specimens, each of Nos. 128 and 145 L. C. 7th ed., in exchange for an equal number of any of the following:—185, 206, 560, 634, 858, 1190, 1383, 1387, 1418, 1462, 1535, 1537, 1538, 1556, 1639, 1640, 1641, 1657, 1661, and 1667. William West, 15 Horton Lane, Bradford.

TRANSPARENT sections from the coal formation showing macrospores, microspores, and other fossil vegetable tissues, in exchange for well-mounted recent vegetable tissues, sections of leaves stained or otherwise.—John Butterworth, Goats, Shaw, near Oldham.

WILL exchange slides of fossil fish remains, for good pocket lens, section cutter, frog plate, live cage; correspondents invited. —Joseph Taylor, Shire Moor, viâ Earsdon, Newcastle-upon-Tyne.

WANTED to purchase second-hand copies of vols. vi. and vii. of SCIENCE-GOSSIP, bound or unbound.—H. Crowther, The Museum, Leeds.

I SHALL be glad to receive lists of foreign Unios from any one having them for sale or exchange.—G. Sherriff Tye, 62 Villa Road, Handsworth, Birmingham.

WANTED to complete SCIENCE-GOSSIP volumes for 1874, 1875, 1876, and 1877. Will give cash or state wants.—T. F. U., 233 Upper Brook Street, Chorlton-on-Medlock, Manchester.

Pupa ringens for good British shells.—Rev. W. C. Hey, Clifton, York.

DUPLICATES of the undernamed good British land and freshwater shells, offered in exchange for numerous desiderata—*Limnæus Burnetti*—same, var. lacustris (Loch Skene specimens taken this season). *L. involutus*, *Succinea oblonga*, *Vertigo pusilla*, *V. substriata*, *V. alpestris*, *V. minutissima*, *V. moulinsiana*, *V. venetzii*.—W. Sutton, High Claremont, Newcastle-upon-Tyne.

FRESH collected cluster-cups on *Rumex acetosa* (common Sorrel) all mounted. Offered for well-mounted slides. Send list to select from.—G. Garret, Harland House, Wherstead Road, Ipswich.

PACKETS of foreign stamps offered in exchange for any good object of natural history.—F. S. L., 2 Oakland Villas, Redland, Bristol.

"London Catalogue," 7th ed.—59, 140, 158, 179, 245, 295, 297, 321, 333, 411, 1239, 1274, 1401, 1595, 1601, for exchange; send lists of duplicates to R. H. Hawkins, Hillside, Hastings.

EGGS of the kestrel in exchange for eggs of the cuckoo, side-blown.—J. B. Pilley, 2 High Town, Hereford.

FOR *Uromyces intrusa* (lady's mantle brand) or *Puccinia glomerata* (ragwort brand), send stamped envelope to T. Brittain, 52 Park Street, Green Heys, Manchester. No exchange required.

SHELLS, miscellaneous collection, land, fresh-water, and marine (named and unnamed), in exchange for natural history books.—Henry Hyde, 2 Ellesmere Street, Regent Road, Manchester.

WANTED, Lyell's "Student's Manual," and "Principles of Geology" for "Palæontographical Monographs," Wright's "Cretaceous Echinoderms," parts 1, 4, 8, part 2 "Fossil Shells London Clay," "Fossil Radiaria of Crag and London Clay," &c.—E. A. Walford, 72 High Street, Banbury.

BOOKS, ETC., RECEIVED.

"The Solar Illumination of the Solar System." By Collyns Simon, LL.D. London: Williams and Norgate.

"Popular Science Review." July.

"Midland Naturalist." July.

"Scottish Naturalist." July.

"Canadian Entomologist." June.

"American Naturalist." June.

"Boston Journal of Chemistry." June.

"Botanische Zeitung." June.

"Potter's American Monthly." June.

"Science News." June.

"Greenhouse Flowers." Part ii.

"Transactions of the Watford Natural History Society." Part iv., vol. ii.

"Ben Brierly's Journal."

"Land and Water."

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 12TH ULT. FROM:—C. P.—J. H. K.—A. J. R. S.—Dr. J. M.—H. G. W.—J. L.—E. D.—C. L.—H. D. B.—H. F. B.—W. C. K.—E. Y. L.—J. T. C. W.—T. W.—A. R. G.—J. A. A.—Prof. P.—T. G. H. —J. G.—T. B. L.—C. F. W. T. W.—R. F. O.—D. H.—F. A. B.—W. J. M.—W. B. N.—C. P.—J. P.—A. H. H.—H. M. H.—G. S. D.—J. F. R.—G. G.—J. A.—F. H. A.—E. E.—E. D. M.—G. C.—E. W. A.—F. S. L.—R. R.—T. S. S. —J. H. H.—J. P. B.—W. R.—H. P.—H. H.—S. D. T.—R. A. B.—J. E. D.—C. J. W.—W. C. H.—C. V. G.—G. E. M. —W. J.—H. E. W.—W. S.—G. P.—J. F. G.—T. B.—E. B. K. W.—W. H. H.—T. F. U.—W. W.—A. C. S.—S. I. O. O'M.—J. B.—W. B. R.—G. A. S.—W. H. L.—E. M. —W. H. M.—J. T.—H. C.—G. S. T.—T. C.—W. H. L.—J. M. —E. A. W.—R. F. Z.—W. D.—J. G.—M. M.—H. H. B.—H. H.—G. F.—R. E. C. S.—W. H. C.—J. F.—&c.

LIFE BELOW THE ICE.

MUCH has been written of late on the destruction of birds and the larvæ of insects by the long continued frost of the past winter. Can any of your scientific readers give a satisfactory explanation of how it is that fish can exist below the ice for lengthened periods, and how, under such circumstances, their respiration is maintained? Many of our mountain tarns in this neighbourhood have been completely covered with ice, in some instances of more than two feet in thickness, for a period of not less than three months. The fish do not appear, however, to have diminished in numbers, and those captured shortly after the ice broke up were in excellent condition.

We know that fish are dependent for their respiration on the oxygen which water holds loosely in solution. By a movement of deglutition the water taken in by the mouth is passed from the pharynx into the gills, and, while escaping posteriorly through the membranous laminæ of the latter, gives off its loose oxygen, which purifies the venous blood contained in the delicate vessels by which the laminæ are traversed. It is a generally accepted fact that this admixture of oxygen with water is principally brought about by the perpetual agitation of the latter by storms, currents, &c. In the tanks of our public aquaria it is necessary to have a continual circulation of fresh water, or a rush of air into each tank, to prevent the fish being suffocated. In the Brighton Aquarium air is pumped into the tanks. In streams, in lochs, partially frozen over, in lochs entirely covered with ice, but supplied with large and inexhaustible feeders, it is not difficult to understand how the supply of air is kept up. Many tarns, however, in our lakeland, Smallwater, for instance, have no stream falling into them. Completely sealed by ice for months, their waters have had no agitation in contact with the air. Their supply of water is drawn from subterranean springs, and that it was very scanty, owing to the absence of rain and low temperature, is proved by the fact that no water escaped from the tarns by these outlets. Many of those tarns teem with fish, which must surely, sooner or later, absorb all the loose oxygen with which the water was charged previous to its being locked by ice. The demand for oxygen is unceasing, and if the usually accepted theory of aquatic existence is correct, what is the source of this supply which the experience of the late frost would almost lead us to believe to be inexhaustible?

I am aware of the exquisite balance which is maintained between land animal and plant life, and which equally exists between aquatic animal and vegetable life, by which the latter decomposes the carbonic acid given off by animals, and produces oxygen, which in its turn aerates the water. This process, however, can only take place under the influence of light, so that in the circumstances we are considering it must be to a large extent in abeyance, for in addition to two feet of ice covering the tarns, there have been six or eight inches of snow, which must have robbed plant life below of nearly, if not of all, sun light. Arctic travellers have told us that when a hole is made in the ice, fish congregate in large numbers in its vicinity, and come to the surface for air; but is it not more likely that they are attracted by the light thus admitted, just in the same manner as salmon and other fish, fascinated by the light of a torch, will lie close under it and suffer themselves to be captured by the unscrupulous poacher? Were they pining for air, it is difficult to believe that life could be maintained. In the northern latitudes, moreover, there are vast tracts of open water in communication with that which is ice-bound. There are great ocean currents, just as there are atmospheric currents, and by the former no doubt an unfailing supply of oxygenated water is being constantly carried

to those regions shut out by ice from atmospheric contact. No such conditions, however, exist with regard to our mountain tarns, and yet certain it is that the fish have not suffered in any way. This is a problem I have not seen explained, and it would be interesting to have a solution of it from some one who has examined it.

Ambleside. PISCATOR.

THE SHEATFISH (*SILURUS GLANIS*).

AT a recent meeting of the Manchester Literary and Philosophical Society, Mr. John Plant, F.G.S., read a paper upon "The Great Sheatfish (*Silurus glanis*) in Loch Bad-a-Luacradh," and gave a sketch of the natural history of the family of the Siluridæ, which includes about a dozen known species, one of which, the *S. glanis*, inhabits some of the great rivers of Europe and a few of the lakes. It is most abundant in the Danube, Volga, and the Rhine, and is known in the largest streams which fall into the Baltic, being also at times caught in the upper regions of the Baltic, where the water is but slightly brackish. It has been obtained from Lakes Neuchatel, Brienne, and Morat; the species is also found in North American lakes and some rivers. The Sheatfish grows to an enormous size in water favourable to its mode of life. Specimens weighing seven hundred pounds are recorded from the Danube, and in America the average size of the adult fish is about three hundred pounds. The bulk of the fishes caught in the season is of less weight. The length of exceptional specimens will reach to twenty or twenty-two feet; but eight or ten feet is the length of large specimens. The general appearance of the Sheatfish is like that of a bulky eel; the eyes are large and frog-like. The head is unpleasant to look at, and the mouth wide; the upper lip is armed with two long worm-like feelers, or barbules, which are kept in active motion, either as sensitive organs of feeling, or to seize frogs and small fish which come within their reach. Its habits are to hide in the muddy bottoms or amongst the roots of aquatic vegetation—only coming to the surface on hot sunny days, after thunderstorms or when the water is frozen over—to keep an air-hole open for occasional fresh-air breathing. It has been attempted twice to introduce its spawn or young fish in English rivers; both trials have failed, although it is a hardy fish and very tenacious of life. The flesh of the Sheatfish is largely eaten in the countries where it abounds, but accounts differ as to its flavour and qualities. At one time in season it resembles fine fresh salmon in flavour, at another time white, fat, soft, luscious and not easy to digest. In the restaurants in the towns along the Danube, the Sheatfish is cooked in so many ways that a traveller may dine altogether upon this fish, and fancy he has been served with a variety of soups and meats. Whether the Silurus was ever, or is now, native to British rivers and lakes is as yet an open question; the peculiar spine which supports the pectoral fin has been dug from deposits in the London clay, i.e. Eocene, and Mr. Higgins, of Liverpool, found one of these spines in clay under a bed of peat at Leasowes, on the banks of the river Dee. So far it may have lived in English rivers at more remote times. In 1828 a fish was caught in a river at Florence Court, Ireland, which was satisfactorily proved a long time afterwards by the Earl Enniskillen and Professor Louis Agassiz to be a *Silurus glanis*; not a fragment of the fish or its skeleton was preserved, which was unfortunate, as its identification depended upon memory alone and its resemblance to a drawing of Silurus. Dr. Fleming notices a remark by Sibbald, that the Silurus may have been seen in the Scotch rivers in his day. The author then stated: "Several years ago I received a letter from a gentleman residing in the highlands of Ross describing an extraordinary monster which had been occasionally seen by his servants and tenants floating on the waters of Loch Bad-a-Luacradh 'Lake of the Rushes' near the coast about Loch Eu. The people called the monster a snail whale; it seemed about twenty-two feet in length, and had two flexible horns on its mouth; it was fond of basking on the surface of the water, particularly after great storms, and looked very much like a herring boat turned keel upwards. In reply I sent a drawing and description of *Silurus glanis*, which was at once recognised by all the people who had seen the big monster as a capital portrait of it. Efforts were repeatedly taken to capture the monster by nets, by baiting, by shooting, but without success, and for three winters similar endeavours to capture it equally failed. It was ascertained by strict inquiry amongst the native residents, that the fish had been seen as far back as sixty years ago, when it was much smaller. An old shepherd had seen it first, a very old dame saw it thirty years ago, a smuggler or illicit whisky distiller who had a bothy hard by the loch often saw the monster in the quiet hours of morn; he did not like the uncanny beast as a neighbour at all." Many other witnesses who gave similar evidence were mentioned by the author, who as well described the methods adopted to capture the monster, but after much trouble and expense it proved too wary and alert to be captured or even to be shot, and the enterprise had to be abandoned. Probably the monster died, or escaped from the loch.

HOW TO RESTORE MICROPHOTOGRAPHS.—Having among my collection of microscopic objects some badly mounted microphotographs, I shall be glad to know if they can be remounted without injuring the photographs. If this is possible, perhaps some of your readers may know, and kindly describe the process by which it may be done.—*W. H. Heasman.*

ODDITIES AMONG SEA-BIRDS.

By P. Q. Keegan, LL.D.

In low estuaries, by the margin of extensive bogs, when the tidal waters have receded far into the ocean, upon some long stripe of sandbank, or where some stakes, posts, buoys, or outlying rocks have been established, an imposing ornithological spectacle may not unfrequently be observed. A muster of long, lanky, long-billed, protruding-necked sea birds is there drawn up in solemn state, not steady or immovable, but rather "standing at ease" in various attitudes. Some of the birds seem to be lazily reclining upon their breasts, in the manner of a great black-backed gull; others stand erect upon their feet, supported by their stiff tail, and stare about them on every side with suspicious, half-timorous, ever-watchful eyes. Two or three members of the flock, however, are engaged in more useful occupations than these, for they busily and assiduously preen their plumage, arranging it in proper order with their beaks, and now and then giving their wings a good shake, fanning them backwards and forwards, and then stick them out "anglewise" from their flanks, in a curiously ludicrous fashion.

These feathered waifs of the sea are cormorants (*Phalacrocorax carbo*). No sooner has the receding tide exposed the more elevated shingles, sandbanks, &c., to view, than a long, spare bird, suspended on powerful pinions, may be observed to alight thereon. Another cormorant follows suit, and then another, until about twenty or so, finding the quarters suitable and safe, elect to occupy them for a brief season. Sometimes some single, solitary, wave-tossed buoy, situated in mid-channel, is observed to be surmounted by a curious bird-like organism in the shape of a sable cormorant, with ever-moving neck, white throat, and expanded or moving wings.

At certain periods of the tidal flow, a flock of cormorants, in response to the demands of appetite, resort readily to certain favourite fishing grounds—places, it may be presumed, that abound lavishly with the finny tribe. Great havoc is committed amongst the fish. It would never answer, however, if the whole of the assembled band of fishing-birds were to give way to their gluttonous propensities simultaneously; for in that case an alert and ever-watchful enemy (such as a human sea-fowler) might possibly take advantage of this temporary blindness of the cormorants, and, rushing down upon the spot, post himself at convenient range for destructive purposes, when the birds again appeared above the surface of the water. A sentinel or two is, therefore, in this case deemed indispensable; and accordingly it is observed, that one or two of the fishing flock remain above, in order to warn their co-mates who are taking their dinner below stairs, of the advent of all dangerous and suspicious characters. Frequently when one of the cormorants has been unusually successful in his fishing expedition, having captured a fish which is rather too bulky and troublesome to manage whilst afloat, he retires to some rock or adjacent sandy beach, where the process of killing, dissecting, and devouring, may be conducted with greater facility. The wandering lover of cliff and shore scenery may frequently encounter, in some quiet retired recess or inlet of the rocks, one or two cormorants busily engaged in the operation of gorging their maws and stomachs with fishy food, the product of the sea.

The birds now under review, in addition to the clownish or ludicrous spectacle they furnish in the aforesaid method of preening their feathers, and of expanding and hanging out their wings to dry, exhibit also juggling or acrobatic talents of no mean order. Observe cormorants while engaged in their favourite occupation of fishing. A bird, after remaining in the depths of the sea perhaps for half a minute, and descending, it may be, over one hundred feet, appears upon the surface, triumphantly bearing in his long, hooked bill, a large fish (say an eel) grasped by the tail. Now, this fish being a slippery customer, the tail end thereof is not the most secure part whereby to retain it. Accordingly, the hapless finny creature is tossed upwards in the air, about a foot or so, in the manner followed by a circus juggler or acrobat, neatly caught head foremost as it descends, and forthwith discharged into the capacious gullet of the ravenous, all-devouring sea bird.

Let us now suppose that a sea-fowler of more than ordinary astuteness and perseverance, has approached within gunshot range of a locality or post, such as a wreck, a waste of surfy sand, a wave-lashed reef of rocks, etc., where a company of cormorants (either of the common or the crested species) is ranged for the combined purpose of reposing, digesting, and drying. He fires, when, lo and behold! what a dismal havoc has been apparently committed! The whole band, comprising, perhaps, some nine or ten fine birds, fall heavily, and apparently lifelessly, downwards into the water, and forthwith disappear as if into a watery grave. "Ah! what a pity it is to have slain so many beautiful and innocent creatures!" the green-hearted sportsman thinks, and perhaps also exclaims; "but then I have done well, very well indeed. I think I had better write to the *Field* forthwith," &c. This grateful elation of sporting pride is doomed, however, to be but momentary; for presently, in the vicinity of the spot where the "poor slaughtered" cormorants sunk, a curious array of beak-like protuberances appear above the sea. The extreme end of a hooked appendage, succeeded perhaps also by a small portion of a snake-like neck, is cautiously thrust above the tide with a sort of a knowing toss, a jeering look, and a general aspect sufficiently indicative of the general fact that the bird to which it appertains is yet "alive and kicking." Another and another head and neck appear in the same mysterious manner from the

depths of the sea, and again are as mysteriously and stealthily withdrawn; and such is the effect thereof, that the "clever" sportsman at last becomes convinced that he has been made the dupe of the wily birds; for when the shot was fired, they dropped in a prompt and nimble manner from off their snug

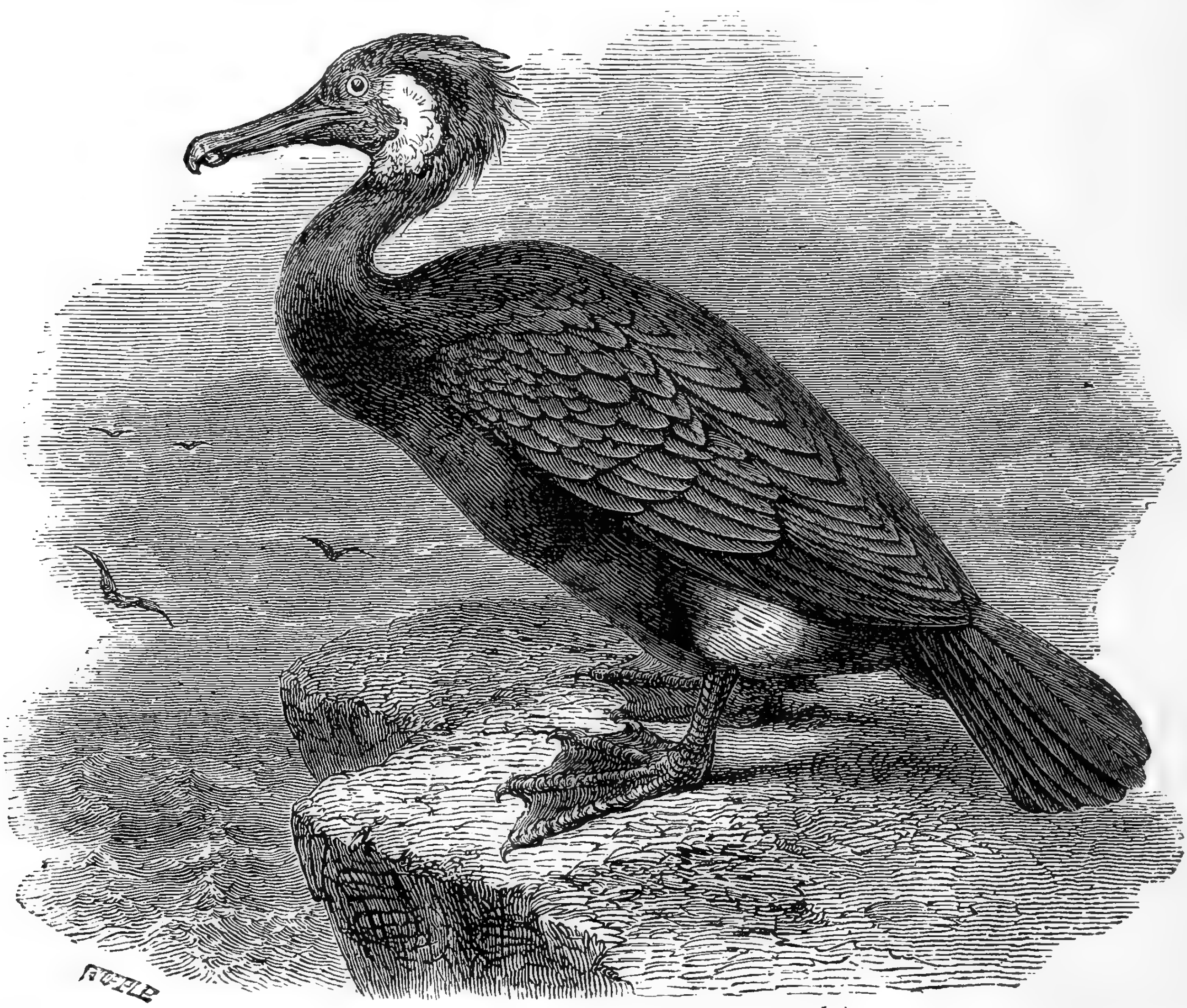


Fig. 149.—The Cormorant *(Phalacrocorax carbo)*.

perches, and leaped, not "dead as mutton," but "all alive" into the opaque and sheltering recesses of the ocean.

Viewed in a general way, cormorants may be regarded as birds of eminent strength and endurance, of unshakable tenacity of life, of marvellous vigilance and cunning, of insatiable voracity, and of excessively rapid digestion. Some naturalists aver that their nature is gentle and pleasant, but we have never seen any indication about them of any special amiability. They may be pronounced "vulgar" birds. There is a coarseness, a roughness about their build, plumage, and general aspect, that certainly does not excite the æsthetic sensibilities; and the horrible odour that emanates from their breeding places would be alone sufficient to identify them with loathsome filth and abomination. They constitute the democracy, or we might rather say the mobocracy of sea-birds; and it is certainly true that you seldom or never see a respectable-looking bird consorting with them in any way. A French naturalist has observed, that the "nature of the cormorant is gentle (*douce*) and he lives in harmony with the birds who frequent the same waters. It is only gulls to whose pursuit he is disposed when they have captured a fish; but the covetousness ceases when they have swallowed it, and he abandons all pursuit." The well-known pet cormorant of Colonel Montagu is described as beautiful, intelligent, and even troublesomely tame.

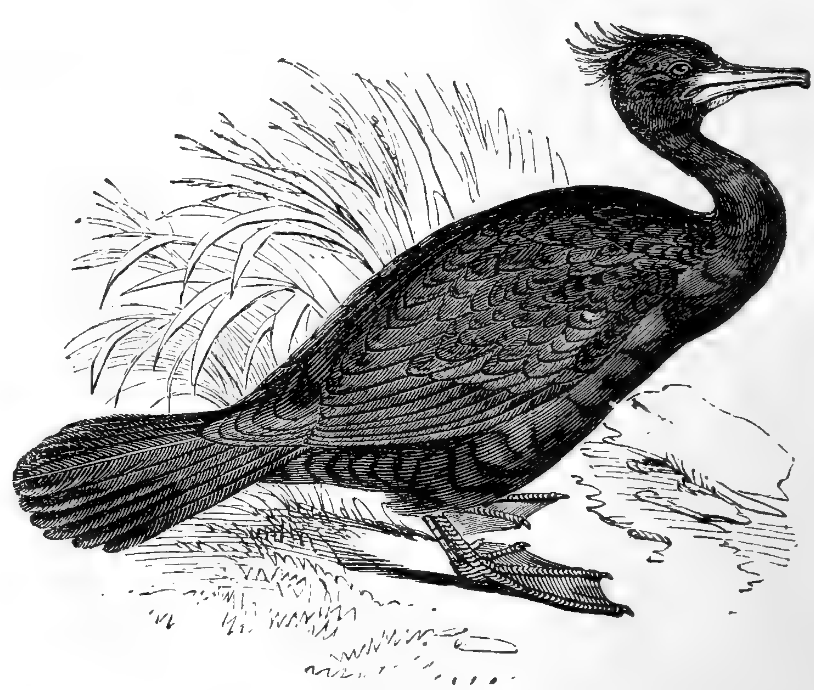


Fig. 150.—The Crested Cormorant *(Phalacrocorax cristatus)*.

Their power of locomotion when on land being exceedingly limited (we have never seen one walking), their sociable disposition, such as it is, could hardly be exhibited to any great advantage. On various occasions we have seen numerous oyster-catchers, and even a black-backed gull or two, in the immediate vicinity of a wing-drying band of cormorants; but we never saw any hostility or discourtesy displayed on either side, each species seeming invariably disposed to mind its own business. Cormorants, moreover, being as regards sight, hearing, build, &c., and every other respect, specially adapted for a sea life, their appearance on shore may be regarded as merely for the purposes of repose and relaxation, and not, as with gulls, ducks, &c., for conjoint and harmonious consumption of shell-fish, &c.

THE STRUCTURE AND DISTRIBUTION OF SPONGES.

By the Rev. H. WALTER SYEN, M.A. Cantab.

THE nature of sponges, whether animal or vegetable, was long a disputed point with naturalists. But it is now placed beyond dispute that the sponges are really animals, and animals endowed with a very interesting and somewhat complex organisation. The general structure of a sponge is familiar to all, but it must not be supposed that the domestic "sponge" constitutes the whole or the most important portion of the animal. In fact, the part of the sponge which is used in every-day life, is little more than the skeleton forming the foundation of the animal structure. Every one is acquainted with the nature of this skeleton, consisting as it does of horny fibres interlacing and crossing in every direction, and in this manner forming a loose yet tough and strong mass of cells and passages. To this fibrous material the name "keratode" (κέρας, *horn*; εἶδος, *form*) has been applied, from its horny nature. The essential portion of the animal consists of a soft, more or less gelatinous substance, contained within and supported by this horny framework. This substance pervades all parts of the sponge, and in some cases forms the entire structure; the horny framework being entirely absent. Both the keratode and sarcode substance (σάρξ, *flesh*; ὁδός, *way*) are generally abundantly provided with calcareous or siliceous spicules, which assume various shapes and sizes. The spicules found in the sarcode are frequently radiate or star-shaped, and are hence named "stellate." Closer examination reveals the fact that the sarcode, or sponge-flesh, is not homogeneous. For, on being submitted to the microscope, it is seen that this sarcode is made up by the aggregation of a number of minute bodies, rounded in form and with a general resemblance to an Amœba. These bodies are the sponge-particles, or sarcoids, and are the ultimate constituents of the animal. Some of them are provided with cilia, by which they are enabled to create currents in the surrounding water, the object of which is doubtless to bring food within reach of the animal. These, then, are the three portions of the bodily structure of a sponge—sarcoid matter, keratric or horny framework, and spicules. It should be noticed that the only portion which is invariably present is the flesh-substance, this being the truly essential portion of the animal. In some sponges both keratode and spicules are absent. If an ordinary "sponge" be examined, it will be noticed that the surface is provided with a great number of orifices; and some of these are, comparatively speaking, few in number and project a little from the surface. The remaining orifices are infinitely more numerous and much smaller. To the larger of these orifices the name "oscula" has been given, and to the smaller that of "pores." It is by means of the "oscula" and "pores" combined with the circulatory system connected with them that the constant passage of water through the sponge is effected. For it will be found on careful examination (which may be effected by examining a small portion of living sponge in a glass under the microscope) that currents set in at the pores, traverse the system of canals permeating the sponge, and finally escape through the oscula. It has been mentioned above that some of the sarcode particles are provided with cilia, and it is by the movements of these cilia in the main that the circulation is carried on. For it has been ascertained that within the external wall, or dermal membrane (dermis, *the skin*), there exist a number of chambers, the walls of which are lined with these ciliated particles, and into these chambers the pores open. The reason of this circulation is obvious. By its agency nutritious particles are brought from a distance for the use of the sponge, and effete matters are removed. It should also be noticed that this apparatus may likewise be looked upon as a mode of respiration, presenting us thus early, as it were, with an example of an aerating process in the animal kingdom. It is very possible that each particle of sarcode matter appropriates for itself, and by itself, whatever food may be thus brought in its way, much in the same manner as does the Amœba. And indeed there seems much consistency in the view which is held by some that in reality the sponge is made up of amœbæ, kept together by the fibrous framework, so that each sponge is in reality a colony of amæbæ every one of which lives independently of the rest. Be this as it may, the resemblance both in structure and in function between the ultimate sponge-particles and the amœbæ, is at the same time suggestive and striking. The development of sponges has not been quite satisfactorily worked out as yet. But it has been clearly shown that there are two distinct modes of reproduction. The first is a true sexual process, the second asexual. Examples of the first can be studied in Tethya and in other genera. In these cases it is found that some

of the sarcode particles take on the structure of ova, each of these being provided with a yolk and germinal vesicle. Other particles have their contents converted into spermatozoa, and by contact of these with the ova, a free-swimming embryo is produced, which, after a time, becomes attached and developes into the sponge.

The phenomena of asexual reproduction have been worked out in the freshwater sponge (Spongilla), and are very interesting and curious. The more central portion of the sponge gets occupied with small round bodies which have been called "gemmules." Each of these is made up of a leathery integument, and is provided with an aperture at one end.

The gemmule is invested with a layer of spicules of a peculiar shape, resembling two wheels united by an axle. Each wheel is provided with teeth. These spicules are so arranged that one "wheel" is in contact with the surface of the gemmule, the other being free. The interior of the gemmule is occupied by a number of cells, the central ones containing each a germ, and by the escape of these cells through the aperture in the gemmule, the spongilla is propagated—for each one of these germs, on reaching a suitable habitat, developes into a spongilla.

It may be mentioned that this asexual mode of reproduction in spongilla only takes place in the winter-time. Before leaving the subject of the development of sponges, it may be well to observe that recent researches render it probable that the sponges will have to be taken from their present position in the animal kingdom, and be more closely allied to the sea anemones and fresh and salt water polypes, certain discoveries in relation to the phenomena of their development making this change of position absolutely necessary by approximating them more closely to the hydrozoa and actinozoa which constitute the sub-kingdom Cælenterata. Until recently the sponges have been regarded as forming one of the groups of the sub-kingdom Protozoa, a sub-kingdom which includes a large number of animals low down in the scale of organisation. Two specimens of this sub-kingdom may be mentioned (in addition to the sponges), Amœba and Vorticella. These animals are good representatives of the limits of the Protozoa in each direction, viz., of greatest simplicity and of greatest complexity, for the amœba is one of the simplest of all known animals, being strictly comparable to any one of the sponge, or sarcoid, particles already mentioned. In this creature no part of the body is differentiated, that is to say, is set aside for any one function. There is no division of labour. But the bodily functions of absorption, assimilation, digestion, and motion, are performed by any portion of the body indifferently. Such an animal is indeed of a simple organisation, and much resembles a portion of animated jelly. On the other hand the vorticella is, comparatively speaking, of a complex organisation, possessing considerable differentiation of tissues and organs, and being provided with a mouth and short digestive canal. The beautiful appearance presented by the graceful vorticella, with its spiral stalk passing through different stages of compression and extension, must be well known to all microscopical observers.

The affinities of sponges have long been disputed points with comparative anatomists; some endeavouring to show that the sponges are closely allied to the Infusoria. Others, again, as has been mentioned above, from recent observations think, and with much probability, that the sponges would be removed to the Cœlenterata. It is not, however, the purpose of this paper to enter into the question, which to be adequately understood, requires a considerable acquaintance with the formal facts of comparative anatomy and of embryology.

Having thus given in brief outline some of the leading facts concerning the structure and physiology of the sponges, it will be necessary to say a few words on the distribution, both in space and time, of this interesting group of animals. As regards distribution in space, the sponges are almost entirely confined to salt water, the genus *Spongilla* comprising the only fresh-water sponges. They occur almost universally; but those whose structure especially fits them for domestic use are obtained chiefly from the islands of the Grecian Archipelago, and from the Bahamas. It will, of course, be perceived that the species provided with a horny skeleton, and comparatively devoid of spicules, are those which are most valuable as a commercial article. Other things being equal, the utility of the sponge will vary inversely as the density of the skeleton and the number and hardness of the spicules. Sponges occur chiefly between high and low water marks, and are found in most luxuriance and abundance in tropical seas. It has been shown that the siliceous sponges mostly occur at great depths in the ocean. There is one genus which is worthy of notice from its habit of boring cavities in shells—this genus is *Cliona*. Fossil-shells from the Silurian are found bored in this manner, excavated doubtless by a boring-sponge. Sponges are very widely distributed in time. Indeed, from the Palæozoic strata upwards, sponges occur in many formations. The maximum of abundance is reached in the chalk. And it is worthy of notice that the flints of the upper chalk are formed round sponges, forming the nucleus, as it were, or centre of deposition. On sections being made of certain flints, minute spherical bodies, provided with spines, have been discovered, and to these the name Xanthidia has been applied. Some observers regard these as the gemmules of sponges; but on this point there is considerable difference of opinion, as there is some reason for regarding them as members of the vegetable kingdom, namely, the spore cases of Desmids. (?) It is obvious that the only trace left by the horny sponges can be owing to their spicules, and consequently remains of these sponges are rare.

The chief group of fossil-sponges is called Petrospongiadæ (*πέτρος, stone*). Of this group, *Sparsispongia* is found in the Devonian, and Ventriculites in the chalk formations.

Lower Silurian sponges are *Palæospongia* and *Acanthospongia*; *Sparsispongia* is found frequently in the Devonian. As already observed, the chalk is richest in sponges, and the most important genera there occurring are *Siphonia* and the aforenamed *Ventriculites*. It is a curious fact that the fauna of the Cretaceous epoch is reproduced, as it were, at great depths in the ocean; for at these great depths Foraminifera, Crinoidea (Echinoderms), and Spongidæ are associated in a manner highly characteristic of the chalk formation.

A few words must be added on the classification of sponges. And it must be confessed that this part of the subject is far from being satisfactorily worked out. The arrangement of Dr. Bowerbank is the one generally adopted. In this classification three orders are formed; the nature of the skeleton being used as the classificatory medium. The first order Keratosa, comprises the horny sponges, whose skeletons are furnished in a greater or less degree with spicula. This order is generally regarded as the lowest. The second order, *Calcarea*, includes the sponges whose skeleton is composed of lime, and the third order, *Silicea*, comprises the siliceous or flinty sponges. In these last the skeleton is made up either of continuous interlacing siliceous fibres, or else of siliceous spicules. The form of the spicules is subject to great modifications; though in the same part of the animal they are constant for a particular species. They form interesting microscopical objects, the different forms being so well marked and manifold in number.

In conclusion, it may be noticed that fossil sponges are more intimately allied to the forms which now flourish in tropical countries than to other kinds. And hence we see one proof of the fact, which is also deducible from other phenomena, that at the epoch when these sponges existed as living beings, a climate prevailed over a great portion of the globe which must have been very conformable to that now existing in tropical countries. So that, from the study of the life-history of such humble creatures as the sponges, we are led to infer that the climate of the earth was not always as we now find it, but that tropical heat once called forth a luxuriant flora and fauna in districts where now arid sterility and desolation prevail, and that icy seas and inhospitable shores now exist where formerly sponges flourished, and the ocean teemed with animal life in a manner somewhat similar to what we now see in the tropical oceans of the world. Considerations such as these would certainly point out to us the advisability of carefully attending to the anatomy and functions of the lower orders of animals and plants; for it has been in the past, and will be in the future, that observations on these points, carried out on strictly inductive principles, have led to some of the most magnificent and comprehensive discoveries and generalisations by which the progress of science has been advanced.

INTERESTING PLANTS IN THE ROYAL GARDENS, KEW.

ONE of the greatest curiosities of the vegetable world is now growing in these gardens, viz. *Welwitschia mirabilis*, and although dried specimens of this remarkable plant are frequently seen, it has never been the good fortune of any person to see a living plant of moderate size in this country before. Seeds have been received at Kew which have germinated, but, from unknown causes, they have invariably died shortly afterwards. The specimen under consideration was imported a few months since, and after being carefully attended for some time has lately commenced a somewhat uncertain growth. This wonderful plant was discovered by the late Dr. Welwitsch on the elevated dry sandy plateau, near the Benguela coast of West Tropical Africa, where it forms a peculiar feature in the landscape The stems rarely exceed one foot in height, but frequently attain a diameter of three feet, and the two cotyledons are, with the exception of the flowers, the only appendages produced, and these remain attached to the stems and continue to increase in length during the whole life of the plant, which in its native country exceeds a hundred years. On old plants the cotyledons are more than six feet long, and about two or three in width, and they are torn by the wind into long strips which trail on the ground, and flutter about in every gust that blows. From the margin of the stem above the cotyledons rises the dichotomous inflorescence on the divisions of which are borne terminal cones composed of imbricated scarlet bracts in four rows, each bract enclosing an extremely simple flower. After flowering, the cones increase to about two inches in length. It can readily be imagined how strange these stunted stems must appear dotted about over a level country, but we can scarcely realise the feelings of Dr. Welwitsch when he first beheld this abnormal member of the vegetable kingdom. The specimen growing at Kew was recently exhibited at a meeting of the Linnean Society, when it attracted considerable attention, as it was the first living plant ever exhibited before the society, and more especially as the plant is not in very vigorous health, and therefore the duration of its life may be rather short. From observations made at Kew the growth of the cotyledon appears to be entirely basal, and to proceed at the rate of about 5-10 mm. per month. We might mention that considerable doubt existed at one time concerning the classification of the Welwitschia, but Dr. Hooker some time since definitely referred it to Gnetaceæ, a tribe of Coniferæ.

LEWIS CASTLE.

HINTS FOR YOUNG MICROSCOPISTS.

No. 2.

In my last paper I referred to a steady head as a requisite to correct drawing with the camera. I would now direct attention to the necessity of a steady hand in dissection under the compound microscope. For ordinary purposes, no doubt, a single convex lens is quite sufficient. But when delicate dissections are required, one has only to transfer the object supposed to be distinctly seen to the stage of the compound microscope to perceive at once that much had not been noticed. Supposing then that a small compound microscope with B eye-piece, one inch objective and an erector be used, the following arrangement for a dissecting table will be found most helpful.

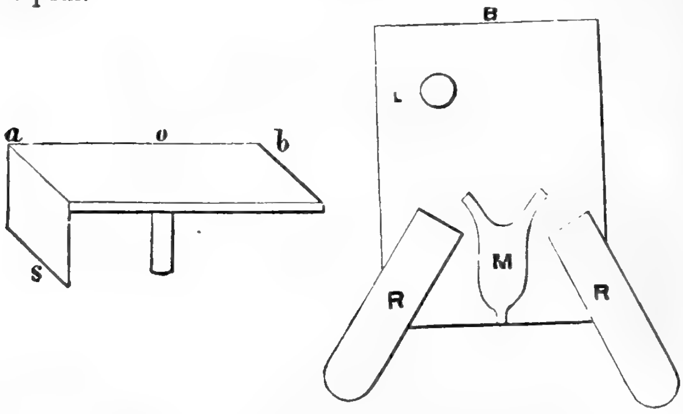


Fig. 151.—Details of Dissecting Table.

A strong low table of the dimensions now given, and standing on four substantial legs, should be obtained. Height twenty-two inches, top nineteen inches by fifteen, the narrower width being from right to left. Upon this table are placed two arm supports, a side view of which is here given. Length from *a* to *b* twelve inches; width four inches, and height five inches. These are so placed as to admit the microscope to stand between them, and the height of the arm rests should correspond with the height of the stage when the microscope is placed perpendicularly. The portion of the rest from *o* to *b* comes over the edge of the table upon the thighs, so as to afford a complete support for half the forearm. These rests are attached to the table only at *s*, where a screw passes from under the table upwards into the middle of the piece of wood *a s*, and so enables the rest to be moved as on a pivot, inwards or outwards, as desired. The top of the table will be then represented by the figure B, where M is the microscope RR the rests, L the lamp. The dissector then places himself on an ordinary chair, draws himself to the table so that his thighs pass under the rests, and goes to work. The height of the table and of the rests can easily be varied a little to suit the operator.

The writer has tried various forms of dissecting tables and rests, but has found none so completely steady as the above.

Codicote Vicarage. T. R. I.

A NEW ROTIFER.

I SEND you a sketch of a rotifer new to me, which I have found on some weeds in one of my glass aquariums. It has only one wheel or ciliated disk; it is very small, and when first observed I took it for a young *Tubicolaria Najas*, as like them it has an irregular case of a gelatinous substance and was surrounded with brownish filaments which are continually added to the case, and in time renders it so thick that the motion of the creature within the case is very imperfectly seen. I concluded that it was not a young najas, as there were two eggs at the bottom of the case, which had passed out of the body and lodged there; this proved to me that the creature was

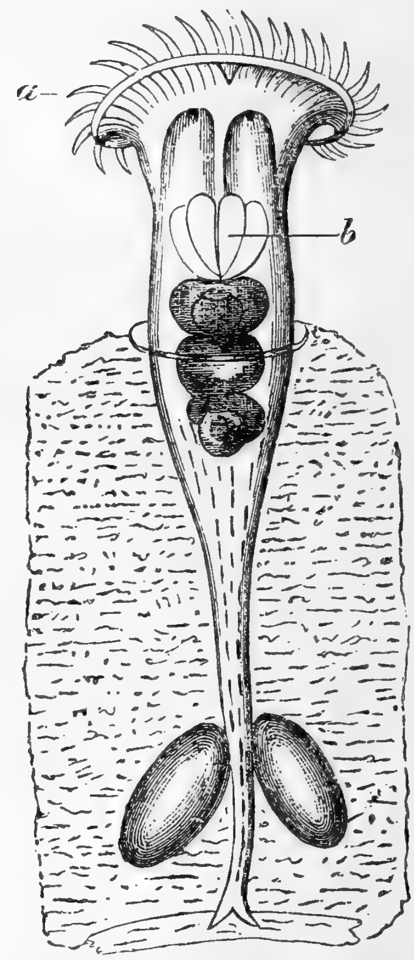


Fig. 152.—A new Rotifer. (?)

a matured one. The eggs I carefully watched, hoping to see the development of them, but the case becoming so thick prevented this. I have found several of them. I make them out to be about $\frac{12}{1000}$ inch in length when fully exserted. Some of them display two eyes (at A) of a very brilliant red colour.

The jaws (at B) are large in proportion to its size, and the cilia are also long, and produce by their action a powerful current or vortex in the water. I have observed some young ones swimming at a swift rate through the water previously to their becoming fixed. When first fixed down they are very transparent, and the action of the circlet of cilia at the head is plainly seen, and also the jaws in motion; indeed, at this time, scarcely any other parts of the body are visible

with the exception of the outline of the creature; but very soon the gelatinous case begins to form round the lower part of the body: at this stage the animal measured about $\frac{4}{1000}$ inch in length. The name of this rotifer (if it has one) I do not know, perhaps some one of the many readers of SCIENCE-GOSSIP may recognise it. J. FULLAGER.

AIDS TO THE CHOICE OF BOOKS ON BOTANY.*

By BERNARD HOBSON.

[*Continued from p.* 183.]

SINCE writing the former part of this paper, I have obtained such a mass of particulars as to rather embarrass me; this must be my excuse for involuntary omissions and want of clear arrangement.

The Third edition of Lindley's "Vegetable Kingdom" was published by Bradbury & Evans, in 1853, at 36*s*. It contains 908 pages, 98 pages of index, and 526 illustrations, with list of all species then known.

I have received four letters recommending "Botany, Outlines of Morphology and Physiology," 42 diagrams; and "Botany, Outlines of the Classification of Plants," 118 diagrams, both by Prof. W. R. McNab, M.D., foolscap 8vo., 1*s*. 6*d*. each; Longmans. The cheapest books I have ever seen are W. Bland's "Elementary Botany," Pt. I. (Organography) 140 cuts, Pt. II. (Physiology) 100 cuts, 6*d*. each; Bemrose. "Botany," by Robert Bentley, F.L.S., foolscap 8vo., cloth, 128 pages, with illustrations, 1*s*., published by the Society for Promoting Christian Knowledge, is a very good little book; the same Society are the publishers of the astonishingly cheap "Flowers of the Field," by the Rev. C. A. Johns, B.A., F.L.S., 663 pages, with 413 really excellent woodcuts, being, as far as I can judge from cursory examination, a complete Flora of phanerogamous plants, on the natural system, with 59 additional pages, enabling it to be used on the Linnæan system, Thirteenth edition (1878), 12mo., 5*s*. The same publishers issue "Wild Flowers," by Anne Pratt, 2 vols., each 4 by 5½ inches, 16*s*., with 192 full-page plates of as many species beautifully printed in colours, a book for children, quite unscientific, but excellent for promoting the love of flowers.

H. Baillon's "Natural History of Plants," not finished yet, 5 vols., 1800 engravings, 25*s*. each; Reeves.

"Introduction to Structural and Systematic Botany," with over 1300 woodcuts, post 8vo., fifth edition, an American book, by the celebrated Dr. Asa Gray, costs 18*s*.; his "First Lessons," with 360 engravings, post 8vo., 7*s*. 6*d*., both nett.

The "Elementary Course of Botany," of Prof. A. Henfrey, F.R.S., F.L.S., Third edition, by Dr. Masters, with over 600 woodcuts, post 8vo., is priced 15*s*.; Van Voorst.

"Vegetable Physiology and Botany," by the illustrious Dr. W. B. Carpenter, new edition, several hundred illustrations, is 6*s*.; Bell & Daldy.

"Vegetable Teratology" (or monstrosities), by Dr. M. T. Masters, 216 woodcuts, 8vo. Ray Society, about 15*s*. 6*d*. The following are "British Floras" not already mentioned:—"Florigraphia Britannica," by R. Deakin, M.D., 4 vols. 8vo., illustrations, 2½ by 2 inches (rather old-fashioned) of every species (1625), Linnæan and natural system, £5, plates coloured (not too well); or £3 10*s*. plates plain. Groombridge.

Hooker and Arnott's "British Flora," £1 1*s*., Longmans, is a standard work.

"British Wild Flowers," including ferns, horsetails, and club-mosses, by C. Pierpoint Johnson, with 1780 coloured illustrations, by J. E. Sowerby, large 8vo., £3 3*s*.; Van Voorst. "Tourist's Flora of British Isles, France, Germany, Italy, Switzerland," by J. Woods, F.L.S., demy 8vo., 504 pp., 18*s*.; Reeve.

Babington's "Manual" may be had on thin paper for the pocket at 12*s*., roan; Van Voorst. Bentham's Handbook is published at 12*s*., without illustrations; 680 pp.

"British and Garden Botany," by Leo H. Grindon, describes native flowering plants and ferns, and all garden plants commonly cultivated, with introduction to botany, 232 engravings, 12*s*.; F. Pitman, London.

"Handbook of British Plants," by W. Lowndes Notcutt, with index, &c., by Robert Hogg, LL.D., F.L.S.; 3*s*. 6*d*; Journal of Horticulture Office. "School Flora," by W. M. Watts, D.Sc. Lon., a general Flora with special reference to Giggleswick (West Riding of Yorkshire), several cuts, crown 8vo., 2*s*. 6*d*.; F. Warne & Co.

"Handbook of British Plants," A. Irvine, 7*s*. 6*d*.; Nelson, 1858 (recommended by a practical botanist). New edition of Withering's "British Plants," 10*s*. 6*d*.; Low, 1863. "Key to British Wild Plants," T. Baxter, 1*s*.; Simpkin, 1871. M. J. Berkeley's "British Flora," (cryptogamic) mosses, lichens, algæ, &c., 8vo., 1844, 12*s*. "London Catalogue of British Plants," seventh edition, 8vo., sewn 6*d*.; Bogue (a list without specific characters or any descriptions). Out of print, no descriptions, but lists of localities. H. C. Watson's "Cybele Britannica," 4 vols., 5*s*. each. "Compendium" of same, 10*s*., 651 pp.; Longmans. On Economic Botany, is "Domestic Botany" (structure, classification, uses of plants), by J. Smith, A.L.S., 16 coloured plates, demy 8vo., 16*s*.; Lovell Reeve. F. J. Meyen's "Outlines of the Geography of Plants" (also culture and uses), 8vo., 12*s*., Ray Society, 1846, is a very celebrated work.

Sir Joseph Paxton's "Botanical Dictionary" contains all species known up to time of publication, with colour of flowers, season, temperature, habitude, duration, height, native country, year of introduction,

* Any of the books referred to in this article may be obtained from Mr. David Bogue, 3 St. Martin's Place, Trafalgar Square, W.C.

but no description or diagnoses (being, in fact, a book for gardeners), imp. 8vo., 623 pages, no illustrations, 25*s.*; Bradbury & Evans. "Dictionary of Dichlamydeous Dicotyledons" (characters of genera and species, culture, uses, &c.), by George Don, F.L.S., 4 vols. 4to., 3468 pages, strictly scientific (natural system) woodcuts, £14 8*s.*; Rivington, &c., now to be had at about 15*s.*

Loudon's "Encyclopædia of Plants" (is, or was, on Linnæan system) specific character, description, culture, history of *all* plants known in Britain, with small and crowded but good cuts of 12,000 species, a standard work, 8vo., 42*s.*; Longmans. Dr. Lindley and Moore's "Treasury (or Dictionary) of Botany," with glossary, 274 cuts, 20 steel plates, two parts, foolscap 8vo., 12*s.*; Longmans. "Dictionnaire Universel et Manuel de Botanique et Horticulture," Dr. Hoefer, 4 francs; Firmin Didot, Paris.

Miscellaneous works relating to fertilisation, &c.:

"Flowers, their Origin, Shapes, Perfumes, and Colours," by Dr. Taylor, editor of this "SCIENCE-GOSSIP," 32 coloured figs., 161 cuts, crown 8vo., 7*s.* 6*d.*; David Bogue. A very interesting book, requiring no previous knowledge of botany.

Sir John Lubbock, in his excellent little book "On British Wild Flowers, considered in relation to Insects," goes systematically through the British Flora, giving numerous illustrative cuts, crown 8vo., 4*s.* 6*d.*; Macmillan. The great Mr. Charles Darwin, F.R.S., is author of "Effects of Cross and Self-Fertilisation in the Vegetable Kingdom," 12*s.*; "Various Contrivances by which Orchids are Fertilised by Insects," 9*s.*; "Different Forms of Flowers on Plants of the Same Species," 10*s.* 6*d.*; "Insectivorous Plants," 14*s.*; "Movements and Habits of Climbing Plants," 6*s.*; "Variation of Animals and Plants under Domestication," 2 vols., 18*s.*, mostly illustrated, all crown 8vo.; John Murray.

On ferns there are innumerable books, *e.g.* "Synopis Filicum," all known ferns, figures of characters of each genus, by Sir W. J. Hooker, F.R.S., and J. G. Baker, 8vo., £1 2*s.* 6*d.* plain, £1 8*s.* coloured; David Bogue. "Species Filicum" of all known ferns, with 304 uncoloured plates, each $7\frac{1}{2}$ by $4\frac{1}{4}$ inches, by Sir W. J. Hooker, 5 vols., 8vo. (1846–64); £7 8*s.*; W. Pamplin. "Historia Filicum," organography, characters of genera, list of species, &c., 30 plates of characters, demy 8vo., 12*s.* 6*d.*; Macmillan. "European Ferns," by James Britten, F.L.S., with coloured plates painted from nature by D. Blair, F.L.S., and numerous wood engravings, in monthly parts 7*d.*; Cassell. "Natural History of British and Exotic Ferns," 479 coloured plates, 8 vols., £6 6*s.*; "New and Rare Ferns" (not in the preceding), 72 coloured plates and cuts, £1 1*s.*; "Our Native Ferns," 50 species, 1300 varieties, 79 coloured plates, 900 engravings, £2 2*s.*, all by E. J. Lowe; Bell & Daldy. "Ferns, British and Foreign" (history, organography, classification, culture, list of species of garden ferns, index of genera and species), third edition, woodcuts, by J. Smith, A.L.S., crown 8vo., 7*s.* 6*d.*; David Bogue. "Ferns of the British Isles," described and photographed by Sy. C., 20 plates, giving all species, woodcuts and glossary, 8vo., 10*s.* 6*d*; Van Voorst. "Ferns of Great Britain and Ireland, nature printed," imp. folio, 51 large coloured plates, about £5 5*s.* net; Bradbury. "Octavo nature printed British Ferns," 169 plates, 500 pages, 2 vols., £4 4*s.*; Bradbury. "History of British Ferns," 22 plates, coloured, 5*s.*; "British Ferns and their Allies," 12 coloured plates, Third edition, 5*s.*; the same in boards, plates plain, 1*s.* (a good little book); Routledge. "Handbook of British Ferns," 5*s.*; Groombridge. All by Thomas Moore, F.L.S. Sir J. W. Hooker's "British Ferns," analysis of fructification; 66 coloured plates; royal 8vo., £2 2*s.*; Reeve. M. Plues' "British Ferns" (and lycopods, equiseta); structure, cultivation, diseases, uses, preservation, distribution; 16 coloured plates, 55 cuts, 10*s.* 6*d.*; Reeve. Seemann's "British Ferns at one View," 8vo., coloured, 6*s.*; Van Voorst. "Fern Paradise" (a Plea, &c.); 4 photographs, 8 views, 8 plates, Fourth edition, 8vo., 12*s.* 6*d.* "Fern World," 4 views, 12 coloured nature printed plates, third edition, 8vo., 12*s.* 6*d.*, both by F. G. Heath; Low. "The Fern Garden," beautiful coloured plates, by Shirley Hibberd, 3*s.* 6*d.*; Groombridge. "Fern Book for Everybody," cuts and plates, M. C. Cooke, foolscap 8vo., cloth, 1*s.*; Warne.

"British Mosses," every species figured on 39 coloured plates, and described, 2 vols. royal 8vo., by F. E. Tripp, £2 10*s.*; Bell. Wilson's "Bryologia Britannica" (mosses), a new edition of Hooker & Taylor's "Muscologia Britannica," 61 plates, plain £2 2*s.*, coloured £4 4*s.*; Longmans (is still the only complete standard). Rev. M. J. Berkeley's "Handbook of all British Mosses," 24 coloured plates, 8vo., 21*s.*; Reeve. Hobkirk's "Synopsis," 10*s.* 6*d.*; Reeve (no cuts, unsuited for beginners); and R. M. Stark's "History of British Mosses," 20 coloured plates, 7*s.* 6*d.*; Routledge. "The Lichen Flora of Great Britain, Ireland, &c.," by Rev. W. A. Leighton, F.L.S., second edition, foolscap 8vo., 16*s.*; David Bogue; third edition, 21*s.* $10\frac{1}{2}$*d.* "History of British Lichens," by W. L. Lindsay, M.D., 22 coloured plates, 5*s.*; Routledge (which see for List of lichenological works). "Lichenes Britannici," in Latin, Crombie, 2*s.* 6*d.*; Reeve. "London Catalogue of British Mosses," 4*d.*; Blow, Welwyn, Hertfordshire.

"Easy Guide to British Hepaticæ;" M. C. Cooke; figures of 136 species, 200 cuts in all, 4*d.*; Bogue.

"Phycologia Britannica" (sea-weeds) generic and specific characters and descriptions, 360 splendid coloured plates, 4 vols., royal 8vo., £7 10*s.*; Reeve. "British Marine Algæ" (all species), 27 plates of genera; coloured £1 11*s.* 6*d.*; plain 21*s.*, 8vo., both by W. H. Harvey; Van Voorst; also, by the same, "British Sea-weeds," 5*s.*; Reeve, 1857. "British

Sea-weeds," drawn from the above "Phycologia," with 80 plates, or 380 beautifully coloured illustrations, by Mrs. A. Gatty; 2 vols., £2 10*s.*; Bell. "British Sea-weeds," nature printed by Johnstone Croall, 4 vols., royal 8vo., 210 plates beautifully coloured, with magnified dissections of all species, £5 5*s.*; Bradbury. "British Sea-weeds," by S. O. Gray (all species); 16 coloured plates by Fitch, 10*s.* 6*d.*; Reeve. Grattan's "British Marine Algæ," 205 capital engravings, but not well arranged, 5*s.* 6*d.*; Bazaar Office, Wellington Street. "History of British Sea-weeds," Dr. Landsborough, 20 plates, coloured, 5*s.*; Routledge. "Sea-weeds," by Mrs. Lane Clarke, 10 original tinted lithographic plates, 1*s.*; Warne. Christian Knowledge Society's "Sea-weeds," coloured plates, 1*s.* 8*d.* Dr. Hassall's "History of British Freshwater Algæ, Desmidæ, Diatomaceæ," 2 vols. 8vo., 103 plates, £1 15*s.*; Longmans.

"Outlines of British Fungology," by Rev. M. J Berkeley, F.L.S., characters of over 1000 species, and list of all indigenous, 8vo., 24 coloured plates, 30*s.*; Reeve. "Handbook of British Fungi," 2 vols., cuts and tinted plates, 24*s.*; Macmillan (entirely technical and unintelligible to tyros); "A Plain and Easy Account of the British Fungi," Third edition, coloured plates of 40 species, foolscap 8vo., 6*s.*; D. Bogue; "Fungi, their Nature, Influences, Uses, &c.," edited by Berkeley, profusely illustrated, 8vo, 5*s.*; King & Co., all by M. C. Cooke, M.A., LL.D. By the same, "Rust, Smut, Mildew, and Mould," (microscopic fungi) 16 plates, or 269 beautiful coloured figs., 238 pages, foolscap 8vo. 6s.; D. Bogue.

Dr. Badham's "Esculent Funguses of England," (history, uses, characters, structures, cooking) 12 coloured plates, 8vo., 12*s.*; Reeve. "Mushrooms and Toadstools," Worthington Smith, F.L.S., two large sheets, coloured figs., natural size, 29 edible, 31 poisonous species, with description, 6*s.*; D. Bogue. "Grevillea," a periodical on Cryptogamic Botany and its literature, edited by M. C. Cooke; Williams & Norgate, 14 Henrietta Street.

"The Journal of Botany, British and Foreign" annual subs., 12*s.* in advance, published monthly by West, Newman, & Co., 54 Hatton Garden, E.C.

NOTES ON INFLORESCENCE.

HAVING for some years paid considerable attention to the study of Inflorescence, I cannot but be pleased to find it recommended to your readers, as it is in your July number. It is indeed to be regretted that "an immense amount of mischief has been wrought to true botany by the ambiguous, loose, and inaccurate use of terms." To begin with the term axillary, which has been applied alike to the flowers of the periwinkle and the pimpernel. The resemblance between the flower arrangement of these two plants is apparent—the difference is real. Flowers of the pimpernel appear in the axils of opposite leaves and are themselves opposite. Nobody has ever seen two flowers opposite each other in the periwinkle. Its leaves are opposite, its flowers are unilateral, as those of the forget-me-not. When it happens, as it sometimes does, that a solitary leaf appears in connection with a flower, the flower is opposite the leaf, not axillary to it. The best botanists affirm that when a flower is opposite a leaf it is truly terminal. Then as to the corymb and the umbel being forms of indefinite inflorescence. I suppose the best example of a corymb is to be found in the pear, which regularly has a terminal flower. Such a flower is also to be found in the umbel of the carrot, and many other plants of the same order, which ought no longer to be called Umbelliferæ, if we are to restrict the term umbel to those cases in which it is indefinite, as in the cowslip and polyanthus. The spike of agrimony is terminated by a flower which expands before that next below it. The staminate flowers of *Mercurialis perennis* are in a pendulous spike with a flower at the end, which is the first to open. The spike of plantago is indefinite. Thus we find several words used in describing forms of inflorescence in a sense as vague as that of panicle. It is to be desired that the use of the term panicle should be discontinued by those who regard it as a form of indefinite inflorescence. It is not easy to say why there should be a special name for a compound raceme, as there is not for a compound umbel. Indeed there are few instances in which such a name would be applicable. Perhaps one may be found in Yucca, where the flowers are large and numerous enough to attract attention. The inflorescence of the cauliflower might be also called a panicle, in the same sense, but it is not often. An abnormal form of inflorescence in a plantain affords another instance. But in almost, if not quite every instance in which British botanists mention a panicle, it is in the sense in which I have ventured to describe it in my "First Catechism of Botany" as a "compound corymb or raceme in which the branches of the peduncle branch again as in the London pride or the great broad-leaved saxifrage." Whoever will examine either of these plants in flower, may find a flower crowning the peduncle and one at the end of every branch, as well as on the tertiary branches. It is likewise in the lilac of which Professor Lindley describes the inflorescence as a panicle, so that in these familiar instances, the panicle is as truly a form of definite inflorescence as is the forked panicle of Stellaria. It would indeed be better in using such terms as corymb, spike, and umbel, which were invented and defined before the difference between definite and indefinite inflorescence was made out, to add the adjective definite or indefinite, so as to say, for instance, that flowers of the cowslip are in an indefinite simple umbel, those of the carrot in a compound definite umbel.

JOHN GIBBS.

THE CEPHALOPODA OF THE CHALK MARL AND UPPER GREENSAND, ISLE OF WIGHT.

DURING the past winter I have carefully searched the quarries and sections of cliff in the neighbourhood of Ventnor for some of the better fossils of the chalk marl and upper greensand, and I heartily recommend this locality to the notice of collectors. A deserted quarry behind Bonchurch, which is called "St. Boniface Quarry," will yield a great variety of good fossils, provided a diligent search is made. In the three feet of fossiliferous marl, which is here exposed, I have obtained *Turrilites tuberculatus* (fig. 154), but, as in the case of all the turrilites, it will be found difficult to extract anything like perfect specimens; the reason of this difficulty is that invariably the turrilites will be found at right angles to the stratification, consequently the fossil is more liable to get broken, unless great care has been taken in breaking the marl. Turrilites (No. 158), of which I only succeeded in preserving three coils, appears to me a variety of "tuberculata," having three rows of tubercles on each coil instead of five, as in the larger specimen. *Turrilites undulatus* (fig. 155) is the one most frequently to be met with in the lower chalk of the Isle of Wight, but we consider it a rare prize if a specimen is obtained having the upper coils perfect. *Turrilites costatus* (fig. 153), perhaps the best specimen in my cabinet, was found in the chalk marl on the Ventnor beach; it differs from undulatus in having the ridges on each coil divided into two distinct parts instead of one long and rather curved line. *Turrilites Bergerii* (fig. 159), I found in the chloritic marl between

Fig. 155.—*Turrilites undulatus.*

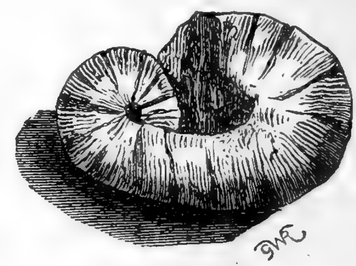


Fig. 156.—*Scaphites æqualis.*

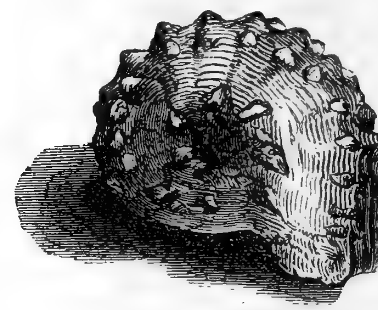


Fig. 157.—*Ammonites falcatus.*

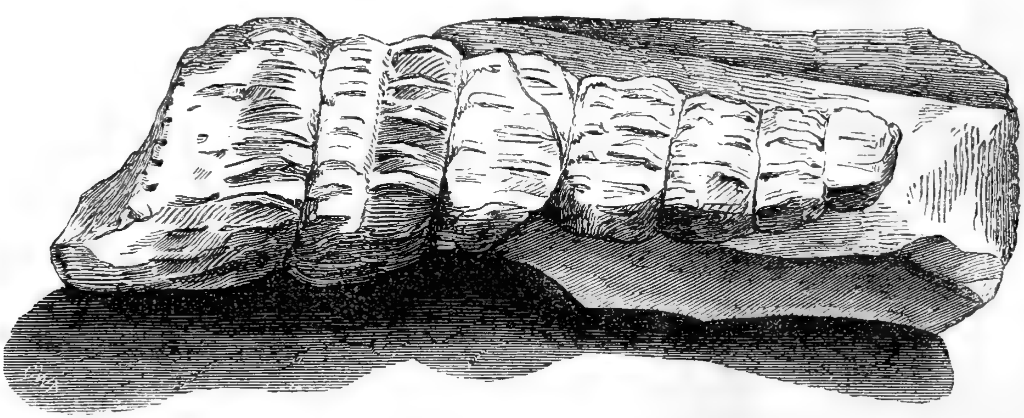


Fig. 153.—*Turrilites costatus.*

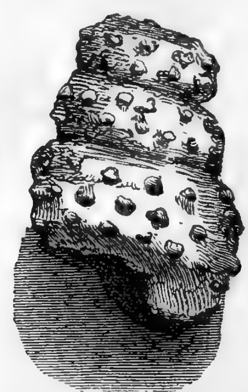


Fig. 158.—*Turrilites* (sp.)

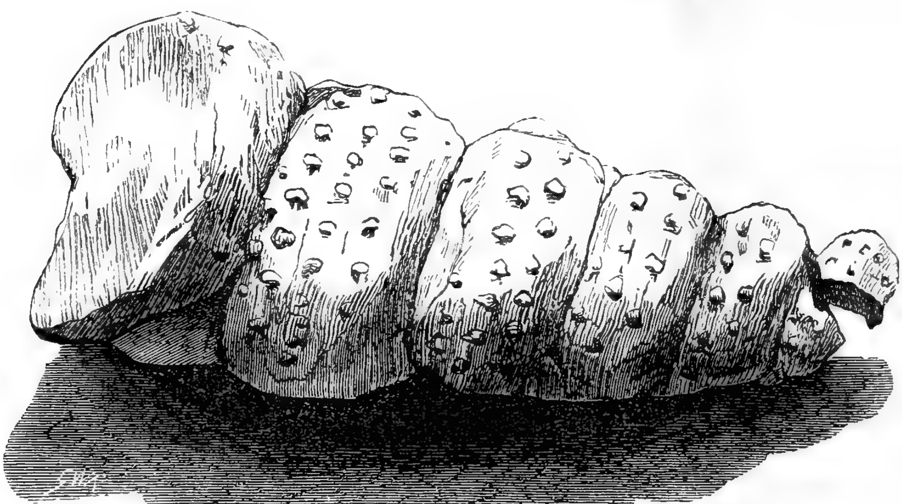


Fig. 154.—*Turrilites tuberculatus.*

Fig. 159.—*Turrilites Bergerii.*

Ventnor and St. Lawrence; this fossil is peculiar to the formation, imperfect specimens being exceedingly common. In Sir Charles Lyell's "Elements of Geology," (page 282) the chloritic marl will be found classified with the upper greensand, whereas local geologists have been inclined to place it distinct

between the chalk marl and the greensand; in either case the formation is a curious débris of former rocks, occasionally even oolitic fossils being found associated with mollusca peculiar to the greensand. In the Isle of Wight the upper greensand is about fifty feet in thickness, the chloritic marl formimg about the upper four feet of this series of rocks. *Hamitis attenuatus* (fig. 160), derived from hamus, *a hook*, is a rare fossil

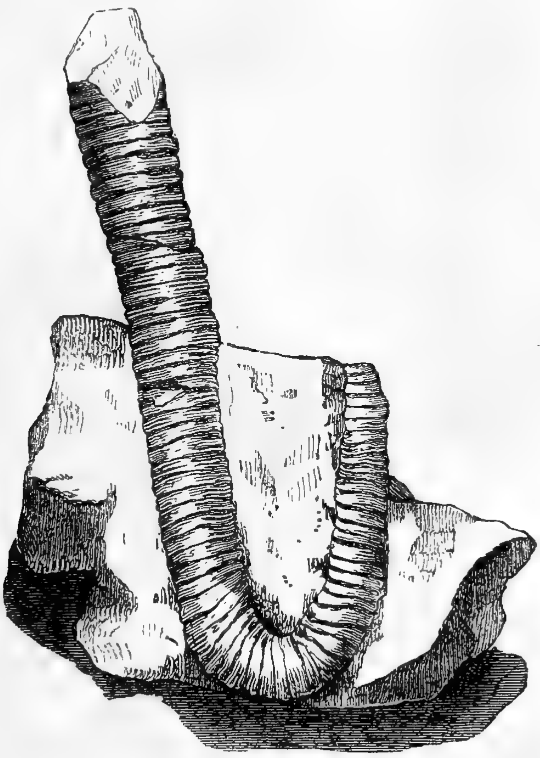


Fig. 160.—*Hamitis attenuatus.*

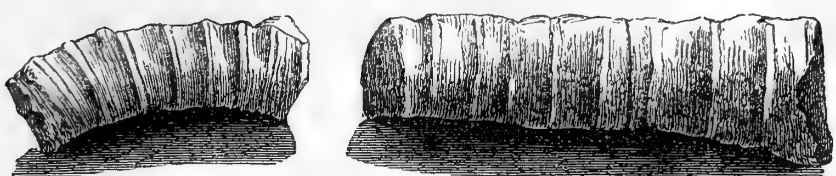


Fig. 161.—Fragments of *H. attenuatus.*

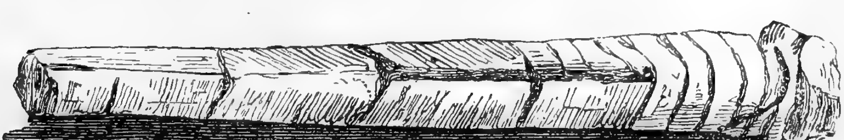


Fig. 162.—*Baculitis anceps.*

which I obtained with great difficulty from the lower chalk beds; this is a fine specimen, showing the separate courses. The fragments (fig. 161) were all from the chloritic marl, and are of various species; in Woodward's "Mollusca," fifty-eight species of Hamites are mentioned. *Baculites anceps* (fig. 162) also comes from the lower chalk, from the St. Boniface Quarry; the valve and four chambers are in this specimen distinctly marked. *Scaphites æqualis* (fig. 156), occurs in one particular band of the chalk marl, a few inches only in depth; once hit on the exact line, and several specimens may be obtained. *Nautilus elegans* is to be found in St. Boniface Quarry occasionally, *Nautilus expansus* being common in the chloritic marl at St. Lawrence. The ammonites are well represented in lower chalk, chalk marl, and greensand. I figure three of the best specimens, *A. Cooperii* (fig. 164), chloritic marl; *A. falcatus* (fig. 157), *A. Mantellii* (fig. 163) lower chalk and chalk marl.

In this short article I have confined myself to the Cephalopoda, but all the characteristic fossils of the

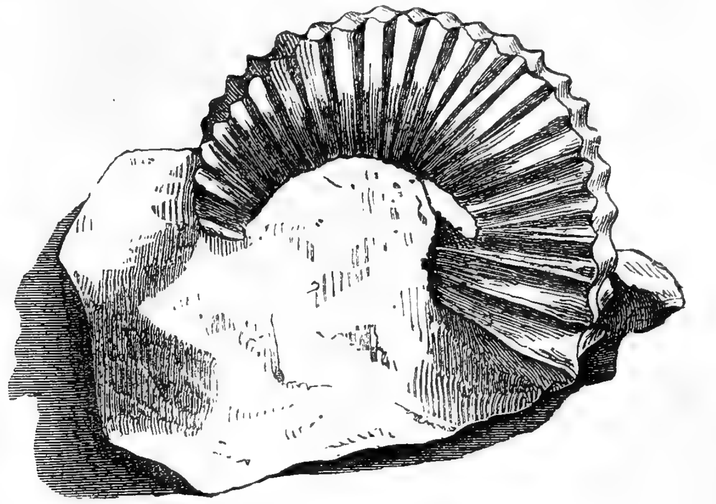


Fig. 163.—*Ammonites Mantellii.*

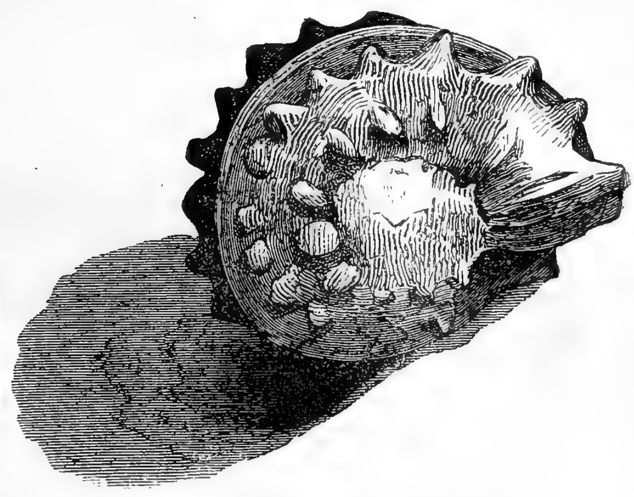


Fig. 164.—*Ammonites Cooperii.*

three formations are to be found. In my cabinet I have teeth and vertebræ of sharks and fish; shells of the various families, Trigonia, Natica, Cucullus, Venus, Pecten, Ostrea, Actæon, Trochus, Pleurotomaria, Panopæa, Lima, Cardium, Terebratula, &c.; also the various Echinites.

C. PARKINSON.

PARASITES ON HEDGEHOGS.—Have hedgehogs parasites, and, if any, have they ever fleas, and have they any means of ridding themselves of them? I read the article last July "My Hedgehogs." I have a hedgehog, and a friend of mine tells me they have fleas. I have never noticed it, and rather doubt the probability of nature having allowed an animal of that peculiar growth to be afflicted in such a manner.—*Singer Barclay.*

MICROSCOPY.

Quekett Microscopical Club.—The fourteenth annual meeting was held at University College on July 25, Professor T. H. Huxley, F.R.S., D.C.L., president, in the chair. The report of the committee referred with satisfaction to the continued prosperity and usefulness of the club, the present number of members being stated as five hundred and eighty. Five members had died during the past year, of two of whom—Mr. P. Le Neve Foster and Dr. W. Tilbury Fox—brief obituary notices were given. The report stated that the attendance at the meetings had been greater than during any previous year, many valuable papers had been read, numerous additions to the library and cabinets had been made, and a new catalogue of the slides in the latter had been issued. The field excursions during the year had to some extent been interfered with by the unfavourable weather; cordial relations had been maintained with kindred societies, and the report concluded with an acknowledgment of the value of the services rendered by the honorary officers of the society. The treasurer's annual statement of account was also submitted to the meeting, and showed that the total receipts had amounted to £373 10*s*. 7*d*. of which there remained a balance in hand of £87 9*s*. 3*d*. The president then delivered the customary annual address, in the course of which he pointed out such lines of study as might be followed out by the members of the club with great advantage to themselves and to the interests of science at large, and showed them that they were in the possession of facilities for carrying such inquiries to successful issues; whilst for the reasons stated, men who had taken up science as the business of their lives were placed at great comparative disadvantage. Votes of thanks to the president for his admirable address, to the Council of University College for their continued permission to meet in that building, and to the officers and committee for their services during the year brought the proceedings to a close. The result of the ballot for officers and committee for the ensuing year was as follows: President, Dr. T. Spencer Cobbold, F.R.S.; Vice-presidents, Professor Huxley, Dr. Matthews, Mr. Michael, Mr. C. Stewart; Treasurer, Mr. F. W. Gay; Hon. Sec., Mr. J. E. Ingpen; Hon. Foreign Sec., Dr. M. C. Cooke; to fill seven vacancies on the committee, Messrs. F. Coles, A. Cottam, E. Dadswell, J. W. Groves, J. W. Reed, J. C. Sigsworth, and T. C. White.

The Diatomaceæ of New Forest.—Mr. Marquand in his interesting paper on the flora of the New Forest, alludes to the Diatomaceæ found in that neighbourhood; among others the pentagonal variety of *Amphitetras antediluviana*. I do not quite understand whether he means that it occurs in or near the forest, or on the Hampshire coast; if the former it is very remarkable, as, so far as I know, the genus is purely marine. I first detected it in a gathering from Hayling Island, and which I described and figured in Science-Gossip 1867, p. 271, as var. γ. Some years afterwards it occurred more plentifully in the stomach contents of Ascidia from Kirkwall; this form may be the same as Greville's *A. nobilis*, T. M. S. vol. xiii. p. 10, pl. 9, fig. 27. *Surirella elegans* (Ehr.) is by no means uncommon, and I have it from several English localities, and it is very frequently found in fresh-water gatherings from Scotland; it is also common in the Toome Bridge deposit. It is somewhat remarkable that Smith did not figure it in the "Synopsis," as I have it on a slide of his mounting, mixed with *S. biseriata*. I can only suppose he overlooked it. A very good figure of it is given in Schmidt's Atlas. *Surirella capronii* is, I believe, only a state of *S. splendida*, the presence or absence of a spine being of no specific value. My late friend M. de Brebrisson sent me a gathering, in which *S. capronii* occurred with one spine only, and sometimes without, in which condition it was not distinguishable from *S. splendida*. Donkin's *S. subalpina*, Q. M. J. vol. ix. N.S. pl. 18. f. 2, is probably only a small state of *S. elegans*; this he remarks "bears a close resemblance to *S. limosa*, Bailey (Q. M. J. vol. vii. p. 179 pl. 9, f. 5)." This form is not *S. limosa* of Bailey, as Brightwell supposed, but *S. elegans*. I speak this with certainty, having seen the original specimen. *S. limosa*, Bailey = *S. cardinalis*, Kitton = *S. ovata*, Ehrenberg (not Kützing). —*F. K.*

Habershaw's Catalogue of the Diatomaceæ.—Mr. F. Habirshaw, of New York, reproduced by the Edison electric pen fifty copies of his catalogue, which he generously distributed amongst the diatomists of Europe and America. This catalogue (with the sanction of the author) Dr. J. Pelletan, editor of the "Journal de Micrographie," proposes to publish in ordinary type, and for this purpose Mr. Habirshaw has corrected and rewritten the entire work. The proofs are to be revised by Mr. F. Kitton, of Norwich. The volume will be an 8vo., and is to appear in three parts, in intervals as short as possible. The subscription price is to be ten francs; the price after publication will be advanced to fifteen francs. This catalogue not only gives a list of genera and species, but references to the pages, plates and figures in the papers of the more important writers who may have written upon them; it also gives the synonymy as far as it is possible to do so.

The American Quarterly Microscopical Journal.—We regret to see an editorial announcement, that the existence of this journal ceases with the volume, the editor finding that it would be impossible for him to give the necessary supervision during the coming year.

ZOOLOGY.

Repetitive Generic Names—A New Field of Work.—There are, I doubt not, many among your readers who, besides acquiring knowledge themselves, would be glad to assist in the general advance of science, but are deterred from attempting anything by diffidence as to their powers, and ignorance as to the direction in which they can best render service. To such I would point out that there is an immensity of work of the highest value to science, that only requires time, intelligence, and perseverance. For example, there are some 50,000 or 60,000 genera of animals (recent and fossil), a dictionary of the names of which, giving author, date, and class, is imperatively needed to prevent names now occupied being attached to new, and it may be widely separated, genera. The need of this may be shown by a few examples (I could fill an entire number of Science-Gossip with such):—

Aspis (Lawr.), 1768, Reptilia.
Aspis (Germ.), 18—, Coleoptera.
Aspis (Treitschke), 1829, Lepidoptera.
Axia (Hübn.), 1816, Lepidoptera.
Axia (M. Edw.), 1837, Crustacea.
Axia (Eschsch.), 1825, Acephalæ.
Axia (Lour.) is a plant-genus belonging to the Valerianeæ.

Lists of genera up to 1868 have been published; these require to be combined into a single alphabetical arrangement, and brought up to the present date, or, say 1880, inclusive. Funds for publication would doubtless be forthcoming when the time arrived. Any one willing to assist in the work of copying and arranging is hereby requested to communicate with *W. H. Dalton, H. M. Geological Survey, Weybread, Harleston.*

Establishing a Rookery.—In your July number, Mr. A. J. Robinson wishes to know how to establish a rookery. Without wishing to dishearten him, I fear he will find it rather a difficult problem. Two gentlemen in this neighbourhood tried all kinds of ways to induce the rooks to build, but without success. In one case nests were made in the trees, but the rooks still refused to come. The trees were also covered with netting, and the rooks fed and kept there; still there was no result. In the other case, the gentleman (a solicitor) tried all the means he could to induce the rooks to build, but in vain. He left the house some time afterwards, and the next tenant was a clergyman; then the rooks came at once and established a fine rookery which increases every year. If it is a likely place, Mr. Robinson and his friends might get some young rooks and tame them, and clip one wing to prevent them getting away—let them get well accustomed to the place and they might build the following season. I shall be glad to hear of any one having succeeded.—*J. Goodyear, Worsbrough, Barnsley.*

Simulation of Death by Insects.—Whatever may be the case amongst the Coleoptera and Arachnida, Mr. Slater's deductions, that the simulation of death is as a rule confined pretty much to those insects whose flight is weak and movements slow, will not hold good as regards the Lepidoptera. In no insect is the habit of feigning death more conspicuous than in that interesting little family of moths—the Hepialidæ, all of them characterised by a very rapid flight, and on account of which the English name of "swift" has been attached to them. I cannot agree with the writer of the paper to which Mr. Slater refers, that the practice of shamming death is not to be regarded as a stratagem to escape danger, all my observations tending to prove to my own mind that it is. I have frequently amused myself by catching numbers of swifts in order to watch their actions, and have from time to time taken all the five species commonly. There was no trouble in "boxing" them when once you had caught them, as their invariable habit is to adopt the "death dodge" and fall helplessly to the bottom of the net; but take them out and place in the palm of the hand, or put them into the chip box, and leave the lid off, and you will not have to wait many seconds before the little impostors are "off like a shot," laughing, perhaps like some begging human impostors afflicted with temporary lameness, blindness, and other maladies, at your credulity. All the Hepialidæ emit a peculiar odour which clings to the boxes in which they have been confined for some few minutes after they have been turned out; probably it acts as a further protection against certain foes.—*Joseph Anderson, Chichester.*

Mimicry in Insects.—The following case of protective mimicry in *Pyrameis Cardui* may be of interest to your readers. The paths of my garden are covered with fine shingle from the beach, and recently I noticed a number of painted lady butterflies (*Pyrameis Cardui*) hovering over one of the paths, occasionally settling on it. In order to notice them more closely, I moved up close to where I had seen one settle, but could not distinguish it until I almost trod on it, when it rose and flew a short distance, and again settled on the path with the wings closed, in which position, from the mottled underside of the wings so closely resembling the colour of the shingle, it was not easy to detect. After remaining quiet for a few minutes it slowly opened its wings, and then sat fanning itself after the fashion of the Vanessidæ.—*Charles Foran.*

Ancylus Lacustris Floating.—The British Ancyli or fresh-water limpets do not as yet appear to have been seen floating, for Jeffreys, in his "British Conchology" mentions that they "have never been observed in a floating position" (vol. i. page 119). But I am able to assert that I have watched two, out of fourteen specimens, making their way in such a position on the under-surface of the water, with shell downwards, as is the case with other Limnæadæ.

These molluscs, which I procured last spring plentifully in an almost stagnant dyke near Lewes, Sussex, on the decayed leaves of *Iris pseudacorus*, are still thriving in my aquarium. This evening (July 22nd) I first noticed two of the ancyli floating, very slowly, but surely, making their way from one piece of duckweed to another; the greatest distance between the fronds of duckweed being about three-quarters of an inch in width. They appear to float in the same way as other Limnæadæ with the exception that every now and then they swayed from one side to the other the forepart of their bodies, apparently in quest of a frond nearer to them than the one in a direct line: they also continually opened and shut their mouths, and generally carried the hind of their shell closer to the tail, than the forepart to the head, so that the shell appeared to have an oblique direction. It was interesting to watch them as they progressed from one frond of duckweed to another, for sometimes on coming to two stems which proximated so closely as not to allow of a passage between them, the little creatures would cleverly turn their shell in a slanting position, and so manœuvre their onward course.—*S. S. Pearce.*

SPHINX PINASTRI.—I have just received a fine specimen of this very rare moth, taken on August 3, by Mr. A. W. Waller, in the gardens of Waldringfield rectory, on an Austrian pine. This makes the fourth specimen taken in the neighbourhood of Ipswich within the last three years.—*J. E. Taylor.*

BOTANY.

VIPER'S BUGLOSS (*Echium vulgare*).—Whilst walking on the South Downs, about a mile west of Shoreham, my attention was attracted by a mass of blue flowers growing in such luxuriance as to be visible at a considerable distance. On proceeding to the spot I found them to be the common viper's bugloss, which had spread themselves over about a quarter of an acre of land, and although there were no other of the same plants visible in the neighbourhood, yet at this particular spot there must have been several thousand plants, the flowery spike measuring from fifteen to eighteen inches in length. I may mention that *Echium vulgare* grows somewhat freely at a spot on the seashore some four miles distant, and I have occasionally met with it growing scantily on the Downs, but the plants have been usually much smaller. I thought its occurrence in such profusion is at least unusual in Sussex, and as such might deserve a note in the pages of SCIENCE-GOSSIP.—*T. Comlidge.*

VEGETABLE "COMMENSALISM."—The association of *Chlora perfoliata* and bee orchis is certainly frequent, although not invariable. During the present summer I have seen them growing together on the cliffs near Beachy Head, and also a few days ago on the Chiltern Hills in South Beds. Last season I noticed them growing in company at another spot in the Chilterns, about two miles from the last-named locality. The bee orchis also occurs in a field at the base of the Chilterns near Barton, Beds, where it sometimes appears in great profusion; but the Chlora is never to be seen there, possibly because the field is occasionally mown. In this district (South Beds) *Geranium pratense* always grows associated with the stinging-nettle, and as I have never seen it, except in grazing fields, it occurred to me the latter prevented animals from browsing on the former. At any rate, the two grow in the closest companionship.—*J. Saunders, Luton.*

BERNARD HOBSON, Tapton Elms, Sheffield, will be glad to receive, not later than November 3, 1879, for publication, carefully arranged under respective counties, post-cards giving Christian and surname, full address, and subject of special study, of *all* persons (ladies included) who are willing to gratuitously assist in determining species, and otherwise personally helping with advice, &c.—or through the post, on receipt of two stamps for reply—all lovers, learners, or beginners of botany, zoology, geology, and microscopy.

THE "STUDENT'S CATALOGUE OF BRITISH PLANTS."—We have received a copy of this excellent pamphlet, compiled by the Rev. George Henslow, F.L.S., according to Hooker's "Student's Flora of British Islands." It is published by Bateman, High Street, Portland Town, London, at 1*s*. 6*d*., post-free.

WILD GEUM RIVALE RIVALLING CULTIVATED MONSTROSITIES.—Last July I gathered near Malham, Yorkshire, a most interesting specimen of *Geum rivale.* The plant was twenty-two inches in height; there were three stem leaves, the highest of which was situated three inches from the root-stock, and then the stem was naked up to the leafy calyx for seventeen inches. Instead of the usual drooping flower, there was an erect monstrous flower, the calyx segments of which had become transformed into petioled leaves, varying from an inch and a half to two inches in length; four of the bracteoles were also transformed into petioled leaves about eight or nine lines in length, the other was an ordinary large but double bracteole. Inside this monstrous calyx, there were about thirty petals fully twice the usual size, their prevailing colour being red; there were also about ten objects which were neither imperfect stamens nor petals, also one perfect stamen. Instead of the female part of the flower the axis was continued for an inch and then produced a perfect normal flower, save that one of its bracteoles was double, and it had the addition of another small calyx segment within the calyx. On this continued axis about three lines from its base were situated five

or six of the petals and imperfect stamens first described, though they evidently belonged to the forty petalled flower, as it would not have had a symmetrical appearance but for them. On this continued axis, about three lines from the base of the perfect normal flower was an imperfect flower containing two perfect stamens and one imperfect one, which were surrounded by about eight bodies, some of which resembled petals, others bracts, and others bracteoles. I may add that in the same district I saw about twenty specimens of *Geum intermedium*, some of which were near *urbanum* though more were nearer *rivale*; about half the number seemed to be exactly intermediate, on comparing all three in the field. I have often found *intermedium*, though only where both *rivale* and *urbanum* occur together.—*William West, Bradford.*

SINGULAR VARIETY OF HARTSTONGUE.—This excellent specimen was gathered by Mr. P. Thompson, at Milnthorpe. It shows the heteromorphic condition of some leaves, when placed in a position favourable to their growth. First, the midrib splits into two parts, then, instead of the ordinary

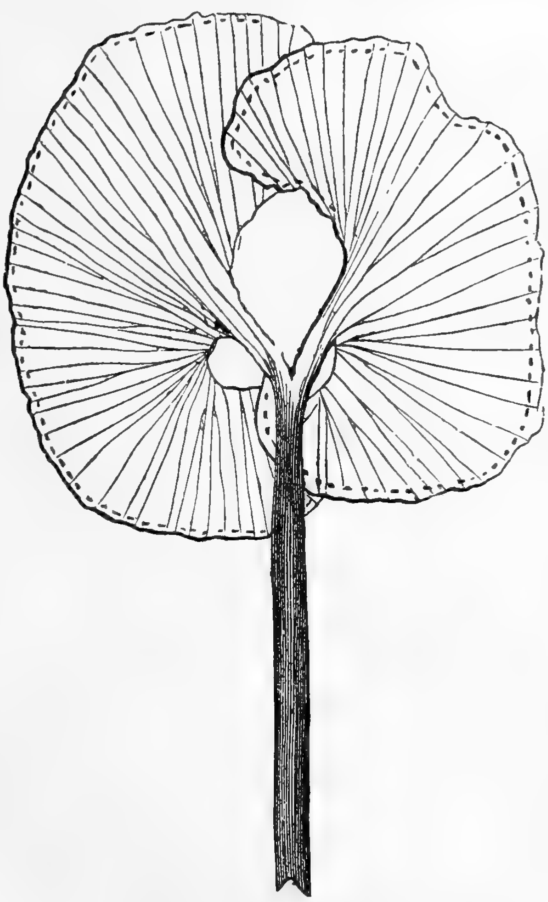


Fig. 165.—Peculiar variety of *Scolopendrium vulgare.*

bifurcated frond, we have the *Scolopendrium vulgare, perafero-cornutum* of Moore's "Nature Printed Ferns." This heteromorphic change is far from frequent; in the present state, we find it in the shape of horn-like projections, or to be better understood "pitchers," for example, the cuplike ending of the midrib, in the Nepenthes—arising, where it has prominent midribs, in the cohesion of the margin of the leaf. The example here figured is peculiar, because after being partially joined, it again separates, with a flattened frond. Our correspondent does not state the condition of the remaining fronds in the plant, probably this was the only one found.

THE POWERS OF VEGETATION.—Trees have the power of adapting themselves to suit the locality in which they grow. Waterton tells us of a nut-tree which grew through the axle-hole of a millstone, which happened to be lying on the ground (some nut-eating animal had stored its nuts beneath the stone and one of them had escaped destruction). The tree increased in size till at length the trunk quite filled the hole. It could not then grow any thicker, owing to its millstone collar, and so it grew taller and raised the stone with it from the ground. I noticed the other day a Jasmine tree which was growing up one side of a brick wall. When, having become too large for the wall, it had no place on which to climb, it sent its branches in several places underneath the coping stone of the wall through holes, I suppose, made by the crumbling away of the mortar. These then grew down the wall on the other side, there being quite as much of the tree on this side as on the other.—*W. H. Cobb, Winchester College.*

GEOLOGY.

"AN ORNITHOSAURIAN FROM THE STONESFIELD SLATE."—This is the subject of a paper by Professor Seeley, in which the author described the characters presented by the impression of the skull of an Ornithosaur in a slab of Stonesfield slate from Kineton, near Stow-on-the-Wold, the peculiarities of which are such as to induce him to found for it a new genus, to which he thinks it probable that most, if not all, the known Stonesfield slate Pterodactyles may belong. It is distinguished especially by the great length of the roof of the skull posterior to the orbits, by the presence of a very deep constriction of the frontal region between the orbits, by the strongly marked sutures between the bones, and the curiously crocodilian character of the plan of structure of the roof of the skull, which suggests the existence of a lower grade of Ornithosaurian animals than has hitherto been suspected. The genus appears to be allied to some forms of *Rhamphorhynchus.* The author names the species, which is in the Oxford Museum, *Rhamphocephalus Prestwichi*, and considers that the other bones of Ornithosauria discovered in the Stonesfield slate support the generic separation of the group.

LOCALITIES FOR FOSSIL STARFISH.—With reference to your wish that any information respecting the fossil starfish localities might be given you, I am happy to mention that I have found the feathery starfish (*Ophiocoma*) in the calc grit which lies immediately under the Kimmeridge clay situated between Sandsfoot Castle, near Weymouth, and the Portland ferry bridge.—*H. W. F., Weymouth.*

THE ANCIENT RIVER DEPOSIT OF THE AMAZON.—Mr. Barrington Brown has contributed a paper on this important subject to the Geological Society. The author described a series of alluvial deposits, varying in thickness from 10 to 160 feet, which have been cut through by the river, and form a series of cliffs, giving rise to striking and characteristic scenery. The succession of beds exposed in these cliffs was illustrated by a number of sections, and it was shown that the strata in question must have been deposited by river action. It was then pointed out that the river is performing two classes of work, namely, cutting away the older sheets of alluvial matter, and depositing the materials derived from them at a much lower level. The interesting phenomena of the cutting of curves by the river, and the abandonment by the river of parts of these curves, giving rise to the formation of lakes, was fully explained; and in conclusion the author showed by a map what vast areas in South America have thus been covered by these alluvial deposits.

NOTES AND QUERIES.

INTELLIGENCE IN MAN AND ANIMALS.—Instinct may be described as a blind adaptation of means to ends; reason, as a conscious adaptation of means to ends. The principal features of instinctive actions may be enumerated as follows: They are performed in early life, are reflex and of much complexity, rhythmical, performed without any guidance from experience, they are executed in precisely the same manner by all the individuals of a species, they carry out a design which is formed *for* the animal operator *by* it, they are prompted by an organic sense of need, and are directly adapted thereto; and finally, they correspond with the *sensori motor* actions of man. Even in certain remarkable cases (as in the well-known instance of a pair of jackdaws erecting a cone of sticks six feet high as a support for their nest which had previously slid down several times from a sloping window-sill) where animals appear to have actually profited by experience, it has been considered that the business of mental analysis and abstraction is here performed *for* them, and that they do not here act with a *conscious* view to consequences. Some of your correspondents have asked whether the intelligence of animals differs from that of man in *kind?* If we consider intelligence as the faculty of knowledge, it is difficult to understand what is meant by different *kinds* of intelligence. We either know more or less about an object; but as for different kinds of knowledge (except it be the question of mediate and immediate, perceptive and comparative), that is a peculiarity not easily discernible. The simple question is, what faculties of knowledge do animals possess, and does man possess the same or different? No one seems to dispute that sense-perception and memory (as distinguished from reminiscence) and perhaps also a rough faculty of comparison are possessed by animals in a degree by no means lower than that of man. But as for voluntary reminiscence, imagination, the powers of abstraction and comparison involved in the formation of general notions, or in a complicated deductive or inductive reasoning process, and the various moral faculties, all of which men more or less possess, no one, not even the mighty Darwin himself, has ascribed to animals. As we can judge of the animal mind only by its bodily actions, and as, consequently, it is only in reference to action that animals can be shown to possess reason, the only difficulty to be solved is, do animals possess ingenuity and conscious foresight sufficient to forestall their wants, and ingenuity and constructive skill sufficient to take the measures necessary for the supply of those wants? Now, there does not seem to be a shadow of evidence that they do possess such qualities. Their method of working without a trace of hesitation, confusion, or interruption, the circumstances under which they work, the identity of motive in almost every case—all unequivocally suggest the idea of an automaton mechanically operating, rather than that of a rational being working by the light of originally conceived aims and ends. Moreover, there are several well-authenticated instances of the irrationality of instinct (as in the case of a beaver building a dam where there was no water, &c.) which strongly tend to demonstrate the existence of a species of uncontrollable impulse on the part of the animal, that must (like a clock set a-going) as it were inevitably perform certain actions, no matter what the circumstances or the consequences may be. But besides acting with a conscious view to certain ends, animals may act from impulse, i.e., from strong special sensibilities inevitably directing as it were the native life-energy, which is always extremely vigorous amongst the lower animals. A powerful development of the *sensori motor* ganglia would amply account for this acting from impulse; and in fact, an anatomical demonstration of the brain of insects (in which instinct is most powerfully exhibited) exhibits this peculiarity in a very remarkable degree. Now, be it observed, that the *sensation* which produces this *motion* may be that of a mental image called up by the association of ideas; and this important fact will amply elucidate many of the instances of apparent reason or reasoning on the part of animals which have been adduced by some of your correspondents. For example, consider the case of the cat rapping at the door, and then scratching at the window in order to gain admittance to certain chambers. The cat knowing the two entrances, when one was closed up, the image of the other was immediately suggested by association, and this idea of the chamber window immediately operated upon pussy's legs, and caused the circumambulating movement described. There was no explicit or implicit reasoning process involved; the act was the result of pure impulse.—*P. Q. Keegan, LL.D.*

INTELLIGENCE IN MAN AND ANIMALS.—I have read with much interest the discussions in SCIENCE-GOSSIP upon this subject, and it appears to me that in this, as in most controversies, a very considerable amount of the difference between the adverse views expressed arises from the want of a definition at the commencement of the controversy of the subject of discussion. What do your correspondents mean by "reason"; and what by "instinct"? Is it not plain that instead of disputing about the same *thing*, they are in fact only disputing about the same *word?* If it were not discourteous, I would venture to submit that the whole discussion, so far as it has as yet gone, may be summarised thus: A. says, "I am convinced that brute animals do possess reason, because I mean by 'reason' something which brute animals show that they possess." B. says, "I maintain that brute animals do not possess reason. For I mean by 'reason' something that it is obvious that brute animals do not possess." Do not all the observed facts lead to this—that if by "reason" you mean the power of inferring

one proposition from another, then brute animals do possess reason? Thus, a horse has impressed upon his mind (whatever his mind may be) the proposition that "Inside this stable door I have found rest, and warmth, and food." And he infers from that, that by stopping at that door he will again find rest, and warmth, and food. But does not all observation lead us to conclude that here the inferential powers of brute animals stop, and that they are unable to follow out a train of reasoning, and, from one proposition known to them only by inference from another proposition, and not by direct sense, to infer a second and from that a third, and so on? And is not that the essential distinction between the inferential faculties, call them what you please, of brute animals and men? In other words, is it not the case that the highest efforts of brute animals in the way of inference reach only to *association of ideas*; whereas, in man, association of ideas, which is the foundation of induction, is the ground and starting-point of all the knowledge which he acquires by those long-continued trains of deductive inference which we call "reasoning?"—*C. B.*

INTELLIGENCE IN MAN AND ANIMALS.—Your correspondent, Mr. Barclay, writes in the June number: "They (animals) have also an innate dread of their enemies." Without intending to take a part in the discussion, I wish to relate one experiment that I made some time ago expressly to ascertain if the statement quoted was the fact or not. I had a young canary bird and bright young kitten. I brought the kitten into the room where the bird was on the floor, and placed the kitten also on the floor a few yards distant. They discovered each other at once, and the first symptom of each seemed to be curiosity and desire for more intimate acquaintance. Each commenced approaching the other. The bird advanced farthest fearlessly—no instinct of an enemy there; but as the bird moved, the instinct of the cat that there was prey was aroused, and the usual manifestation and passion of the cat tribe was shown. That alarmed the bird, and it at once retreated. This experiment proved that there was no innate dread of an enemy on the part of the bird; and on the part of the cat no anticipation of a good meal at first sight. The conclusions that each appeared to arrive at were "after thoughts," whether they are to be called instinct or reason. The two explanations of why rats gnaw leaden water pipes (page 140) are both improbable. It is a common trouble in this place, and the remedy is to substitute brass or iron pipes for lead. The true explanation most likely is, that when the temperature of the water in the pipe is below the dew point, water is condensed on the exterior of the pipe. Rats and mice need water, finding it there they try to get it, and their mouths and teeth not being adapted to lapping, the teeth cut into the soft material of the lead. That is all. They do not gnaw iron pipes, for the material is too hard.—*Charles Stodder, Boston, U. S.*

INTELLIGENCE IN ANIMALS.—I have a large smooth-coated dog, of no particular breed that I am aware of, which (I had almost written who), has a decided perception of Sunday from the other days of the week. To him the only difference is that on Sundays I am in the habit of taking him for a run after morning church. On each morning as I leave home for my business my dog sees me out, and when the door is shut he goes quietly and takes his customary morning nap; but on Sunday nothing of the sort takes place; he certainly sees me out, but not with the like composure; his features are anxious and expectant, and though quiet there is an evident latent excitement. No sooner is the street door shut than he bounds upstairs to my bed-room and gets his fore feet and head out of the window and watches me out of sight, and no inducement can entice him from his vigils until my return. In the place of his morning sleep there is constant watching. Should his patience become exhausted he will make a rush to the street door, but this is apparently only as a diversion, for he is back again at once to the window, watching and waiting, at times giving way to distressed moans. And when he sights me on my return his frantic joy goes to the extreme of ecstasy. The mystery to me is how he can distinguish one day from the others. My movements at home on Sunday morning are similar to other days: I do not even make any perceptible change in my dress; I go down to breakfast in the same manner, and occupy about the same time at it; I return to my bed-room afterwards as on other days, and yet this dog knows one day from the others as well as I do. The only difference that I am aware of is that on Sunday I do not rise so early, but as the whole of my household observe a similar indulgence the same order of events is preserved. As there is cooking going on in the kitchen, the dog has been given to understand that he is not wanted there at such times, and on two or three occasions after our Sunday's ramble, he has been kept waiting on the door steps while the kitchen door was shut; he now waits without any reminder, whatever the weather may be, and he makes no attempt to enter the house until he is bid, and neither will he attempt, as a rule, to go into the kitchen until the cooking is over. But I am bound to say that I do not claim for him a higher degree of rectitude than belongs to the ordinary run of the "superior animal," and I am not certain that the savoury smell from the lower apartments would not be a strong inducement to disobey orders if a little watch were not kept over him. However, there is in him the certain knowledge of good and evil, for when he is detected in an attempt to infringe the rule, which, to give him his due, is very seldom, he exhibits certain evidences of a guilty conscience and profound penitence, unless the subdued look and dropped ears are but the veriest hypocrisy; but we soon forgive him, being well aware of his infirmity for tasty morsels. I may observe that when I take my friend for a run on other days than Sundays, which is of rare occurrence, he adheres to the rule of waiting at the door until told to enter the house, but this is observed only in the early part of the day, as on the evening of *all* days he does not wait for any bidding. —*J. R. Hayes, Barnsbury.*

INTELLIGENCE IN SEA-GULLS.—Perhaps some of your readers may be interested in the following incident. For the last four years we have kept a pair of herring gulls, which we have allowed to roam about the garden fields. The other day, as some little chickens were going to be led out into the field, it was necessary to shut the gulls up, of which they are very fond; so they were put into the fowls' yard; upon which one of them (the male) began to chase the fowls, and at length succeeded in securing them in a corner of the yard, then all of a sudden he made a dart right into the midst of them; scattering them right and left, after which he chased the cock round the yard, and then repeated his chase amongst the fowls; but still he was not satisfied till he had driven every one of them into the hen-house (at 3.30 P. M.), where they stayed for the rest of the afternoon. Probably the sea-gulls did not approve of being shut out from the garden, so they thought they would make the best of it by having the yard all to themselves.—*Horace Livens, W. Croydon.*

THE SAGACITY OF A THRUSH (A CAGE-BIRD).—My interest in this bird has been roused within the last day or two, and it may interest some of your readers if I describe the facts which have come under my notice. My attention was called by the owner of the thrush, who had received from a boy a nest of five young thrushes, which were put into the cage with the old pet, nest and all. Worms were thrown into the cage for the old bird, upon which an attack was made as usual, and after breaking them in pieces it began to feed the young ones, as if they were its own family. Now, considering that this bird has never been at liberty, it appears to me that a most wonderful amount of sagacity has been shown by this act, and it is clearly instinct and sagacity, and not practical experience, which has taught the bird how to look after and tend upon the thrushlings. And surely in this act is reflected the care of the Provider, the Maker, and the Guider of all. I should be glad to know if any of your readers have ever noticed this act before on the part of a cage-bird.—*A. H. Hulley.*

SAGACITY OF A CAT.—We have a very interesting cat at home. She is a fine Angora and a capital mouser, though now getting rather old for such work. In her earlier days she would go anywhere after a mouse. I remember that once she ran up the curtain and caught a mouse at the top, and another time she rushed up the chimney while a red-hot fire was in the grate and returned with a mouse, covered with soot; where the mouse was caught I cannot say, but it is perfectly true that the cat went up the chimney. It is not, however, of her mousing exploits that I wish now to speak. She grew very fond of a housemaid who was with us when first she came, and used to follow her all over the house. Whenever the cat caught a mouse or a bird she would, before she ate it, lay it down at the housemaid's feet. If the maid took it away, she never attempted to get it again and eat it, but let it lie there. As the housemaid always threw the birds away it stopped her from catching them, but afterwards when the housemaid left she again took to her old habits, and we missed many birds out of their aviary, finding their feathers alone stuck in the bars; the cat must have pulled the birds through the wires, which are only a quarter of an inch apart. When the housemaid left us the cat also disappeared for some weeks, and when she did come back, moped about in the garden all day, for a long time. When the house was painted the cat went away till the men had left, when she immediately returned and now sits almost all day before the kitchen fire.—*F. A. Bather, Roehampton.*

FLIES AND PEDESTRIANS.—Can any of your contributors suggest a remedy against being followed, for miles I may say, by a troop of flies, who, taking advantage of the warm summer atmosphere, attach themselves more particularly to the head of the pedestrian, and cause much annoyance by settling upon the face, neck, ears, &c.? I am under the impression that the leaves of a particular tree or shrub, rubbed upon the face of the clothes and hat, act as a preventive, and I think that this fact was conveyed in a former number of SCIENCE-GOSSIP. Probably the circumstance alluded to will bear repetition.—*W. W. Ingall.*

SLOW WORM.—In answer to W. G. T.'s question in last month's SCIENCE-GOSSIP as to the reddish-purple variety mentioned by Mr. E. D. Marquand, I have had four of this colour among a dozen sent from Yorkshire. They were about ten inches long, and of a bright copper colour, with black lines running down the sides from head to tail. I have seen some scores of slow worms, but have only noticed these four. I have now a slow worm measuring eighteen inches long, which is rather an unusual length for this reptile. They will live a long time in an ordinary fern case, and may be fed on white slugs, which they seem to prefer before anything else; a small pot of water should be placed in the case with them, as they are rather thirsty souls, immersing nearly the whole of the head while drinking. They are altogether very interesting to keep.—*G. Currie.*

ROBERT MUDIE.—Is there any biographical account of this pleasing writer? His work, the "British Naturalist," delighted the world sixty years ago. His "Feathered Tribes of Great Britain," "Guide to the Observations of Nature," "Seasons," "The Earth," &c., did much to promote the study of natural history. He was a man for an age not for all time; but we have attained to our present advanced state of general interest in the grand operations of Nature, because Mudie and others like him well lived and wrote. Perhaps some of your readers can supply an article on this matter.—*Robert B. Botwell, King's Langley, Herts.*

PALM IN FULL BLOOM.—We have on our lawn a dwarf palm, which will shortly be in full bloom, and thinking it unusual to see such in England, I write to ask if you or any of your readers know of another. The plant is about seven years' growth, and has never been protected by any covering during the winter. Last year it bore four spathes of bloom, and this year six. Our gardener has given me the following dimensions of the plant: "Height of plant, 5 feet 4 inches; width, 6 feet 8 inches; circumference, 20 feet; height of trunk, 2 feet 10 inches; circumference of trunk at base, 2 feet 10 inches." It may interest your readers to know we have also a Paulownia which has blossomed several times, and some seed ripened from which we have raised a fine young tree. We have too a plant of *Phormium tenax*, which the year before last had two flower spikes, one being nine, the other ten feet high, which bore respectively 22 and 28 seed pods, which ripened; and we have now some young plants raised from them and growing nicely.—*E. D., East Cosham, Hants.*

CAN WORMS CRAWL BACKWARDS?—Having read the Rev. J. G. Wood's statement that "it is impossible for the common earthworm to crawl backwards," and also Mr. W. Budden's note thereon in the May number of SCIENCE-GOSSIP, I was induced the other evening to experiment with a large worm in the garden. It was proceeding along the path at a quick rate, when I interrupted it by giving it several gentle taps on the head with a small stick. At first it seemed inclined to push on, but after repeated taps from the stick it suddenly began to move backwards, and continued to pursue its way in this manner until it got out of sight. This incident confirms Mr. Budden's statement, that "worms *can* and *do* crawl backwards."—*G. O. Howell, Shooter's Hill.*

WORMS CRAWLING BACKWARDS.—I can readily confirm the statement of your correspondent, W. Budden, that worms can and do crawl backwards; especially when, as he describes, they are touched on the head by a small stick or any other substance. Only a day or two since I saw two worms crawling on the wet road, and by gently touching the head of one it began to alter its course, with its head, to one side, I again touched it and it immediately began crawling backwards. The other one I wanted to get to crawl on a piece of writing paper, but whichever way I presented the paper to it, it would endeavour to avoid it and crawl the reverse way.—*J. G. B., Wrotham, Kent.*

Sparrow-hawk's Nest and Eggs.—On the 8th of May last I found a sparrow-hawk's nest in a small fir-tree, containing one egg only. As I very much wanted a good specimen, and yet did not wish the birds to forsake their nest, as they would in all probability have done had I left it empty, I took the one egg and left in its place a blown one of the same sort, which was rather an indifferent specimen. On the 10th I again visited the nest; the old bird flew from it, but it contained only the blown egg I had left. On the 13th I went again to see it, and found two fresh eggs laid, and the blown one thrown from the nest on the ground below. Thus for two days following the day on which the first egg was laid no other was produced, and during the next three days two only were laid. This seems directly opposite to the opinion held by the best authorities, that the eggs follow each other day after day, and that when they are matured it is beyond the power of the bird to abstain from laying them. Could any one explain these apparent difficulties?—*T. L. S.*

Plates of Bird's Eggs.—Since replying to a question in Science-Gossip a few days ago relative to diagrams of birds' eggs, I have ascertained that Messrs. Hachette and Co., the French publishers, of King William Street, Strand, will undertake to procure these or any other diagrams of the series to order. If you think it worth while to append this information to my former note, please do so at your discretion. I have many of the series; can furnish lists of the whole if required.—*Richard Lewis.*

Cuckoo's Eggs.—Your correspondent F. Anderson, in the June number, remarks on the rareness of the cuckoo's egg being found in nests, on, or near the ground. A friend of mine found the egg of the cuckoo in a skylark's nest, and in the grey wagtail's. —*E. V. Seebohm, Barnes, S.W.*

Extraordinary situation for a Thrush's Nest.—On the outside wall of a beer-shop called the "Gladstone Arms," in the town of Wrotham, directly under the sign-board, over the front door, a thrush has built her nest, and is now sitting quite closed; the nest is only about two or three feet from persons' heads as they enter the door, and slightly screened by a few branches of a monthly rose and tea-trees. The landlord is very proud of his neighbour, and affords her every protection as a reward for the confidence she has placed in him.—*J. G. B., Wrotham, Kent.*

Removing Shells from Brood.—Can any of your readers inform me how most birds so effectually remove the shells of their eggs when their brood is hatched, and what they do with them?—*J. M. W.*

Query as to Nest.—In the early part of June, 1878, I was botanising in Berkshire, when I accidentally discovered a bird's nest, and being unable to find what it might be, I thought some of Science-Gossip readers might be able to tell me. The nest was built in a tall bramble-bush, about four feet from the ground, composed of twigs, with a lining of hair. The size was about that of a greenfinch's, but there was scarcely any cavity for the eggs, which were five in number, and exactly the size of the house-swallow's; they were a pure white, but thickly spotted at the large end only with red. The bird was sitting on the eggs, and as far as I could see closely resembled a whitethroat. The locality was a piece of waste ground close to a large pond, and on the borders of a wood.—*Junior.*

Curious Sites for Birds' Nests.—Remarks by "G. T." at page 141 recall doubts formerly often felt, and since revived at intervals, as to who might have been the original architect of some particular nest. Being again reminded of the subject, and without reliable book, readily accessible, to tell what really distinguishes the home of hawk, magpie, jay, crow, or wood-pigeon, I am under the impression the nest of the latter is flat and smaller in proportion to size of owner; one found, seven or nine feet up in underwood, was a mere plate of wicker-work. The plump featherless spinous squabs, with disproportionate beak and head and distended crop, were passed down, panting and palpitating, to close their eyes and die, as my young fellow-marauder asserted, from the heat of our hands and of fright. Other nests referred to are often protected by the fork of a stout limb, or are placed in an outer fringe of twigs incapable of supporting the lightest climber, yet so matted and interlaced as, together with the height and structure, to afford considerable immunity from missiles. Those who have clambered and closely observed, may be aware of differences in arrangement and construction that I should be glad to be made acquainted with. From the ground the nests seem to be much alike: those of crows and hawks being perhaps more roughly put together and made of thicker materials, whilst the nests of magpies and jays are somewhat better finished, deeper and of slighter and more pliant sticks. The strong straight beaks and the feet of the two last-named genera are, no doubt, handier tools for nest-making than the corresponding members of hawks. When the former birds were more abundant, they were bold, establishing themselves near the haunts of man, whilst wild pigeons and wary hawks sought the deeper and more secluded recesses of woods. A crow occupied an oak at the verge of a spinney close to a poultry wife's back door. It overshadowed the recreation-ground of her feathered charges. A small cluster of oaks, enclosed between thick double hedges, with tall fir-trees, formed the termination of a pleasure-garden and orchard, and separated the crow's oak and spinney from a kitchen-garden flanked by another and larger copse on the far side. A pair of jays located themselves in a huge tree overhanging the kitchen-garden with its prospective currants and rows of green peas. A hundred yards farther within the copse and the same distance from young poultry and laying hens, a magpie selected an oak placed almost singly where the underwood was cut. Beyond where this remained untouched, a hawk built on a similar tree, tall, of moderate size, and without branches below a spreading head. The birds mentioned oppose appropriate cunning to the evil intentions of numerous enemies. A concealed, or open watcher may wait in vain for hours expecting ingress or egress; sticks and stones are hurled, and shouting tried without result to dislodge the occupant of an almost bullet-proof citadel, yet, when, for an instant, vigilance relaxes or patience wanes, the artful bird drops, like a stone, perpendicularly to the earth; almost brushing the face and breast of the stalker it dives through the long grass and fern to be immediately lost to sight; or, possibly, turning away for a moment, on looking back we see her slipping off noiselessly on the other side, passing behind a faggot pile or through the shelter of intervening trees, and thus getting quickly out of range. Few birds are more sly than the perky jay, hopping from bough to bough, jerking its long tail; crest and buff coat and blue and black barrings of wing glistening in early sunlight. 'Twere as easy to "lure the wild vulture from the heavens" as get him in hand, but if the parents be killed, fliers continue to hover about or soon fall

victims to the old gardener or keeper—thus somewhat discrediting the theory that impressions strongly implanted on the brain of a parent are transmitted; so as to act without supplementary teaching—the instinct of swallows for example.—*F. F.*

TEA STAINS.—If a strong decoction of tea is added to a solution of iron sulphate, a black coloration is immediately given. It is formed owing to the action of an organic astringent acid present in tea, and is very analogous to the formation of ink, by mixing together tincture of galls, and sulphate of iron. Attempts have been made to utilise spent tea-leaves for a like purpose.—*C. J. W.*

TEA STAINS.—Dry tea-leaves contain from thirteen to eighteen per cent. of an astringent principle, which is a modification of tannin. This, in contact with iron, produces a blackish-blue precipitate, in fact, a kind of ink.—*W. M. Holmes.*

TEA STAINS.—Most teas contain tannic acid in greater or less quantity, and when tannic acid comes in contact with steel, tannate of iron is formed, which is of a bluish-black colour. Tannate of iron is of course the colouring material of ordinary black ink. R. N. B. will find ample information on tannic acid in any work on organic chemistry.—*Rev. S. D. Titmas, Godalming.*

UNDER WHAT CIRCUMSTANCES IS THE YEW POISONOUS TO HORSES AND COWS?—Youatt states in his work on "Cattle" on the authority of M. Husard, that "in Hanover and Hesse cattle are partly fed upon leaves of the yew. The quantity of yew is small at first, but it is gradually increased until it constitutes the greater part of the food. The inhabitants of Hanover and Hesse are nevertheless perfectly aware of the poisonous properties of the leaves of this tree, and are sometimes taught, by dear experience, that it will destroy their cattle, unless it is managed with this degree of caution." The poisonous properties are due to a substance called "taxine," which has not yet, as far as I am aware, been thoroughly examined. Most authorities have agreed that yew leaves in all conditions are poisonous both to man and cattle; and it would not be difficult to furnish overwhelming proof of this. Is your correspondent J. H. G. quite sure that the van-horses ate any of the yew from the garden? If not, the fact that they have never suffered, may be easily accounted for.—*W. M. Holmes.*

COSSUS AT SUGAR.—With reference to this subject I may mention a similar instance of this insect coming to sugar some two seasons ago; when going on to the field rather later than usual, and not considering it a good locality, I put the mixture on rather sparingly, so this individual must have been possessed of very keen senses. It was a fine female, and came on at about dusk, almost before anything else. Is there any satisfactory reason why the Nocturni so seldom seem attracted by the sugar? If any of your correspondents could suggest such, I should be glad to receive the information.—*A. Horsley Hinton.*

COSSUS ON SUGAR.—While sugaring with a friend in Highgate Woods in the summer of 1876, I was surprised to find a fine male specimen of cossus, seated on the higher part of the "sugar streak," evidently enjoying his unexpected luxury. My friend succeeded in capturing him, and now has him in his collection. On mentioning this capture to another entomologist in the wood, I was told that they are to be caught by sugaring on the willows on the banks of the Lea in Essex.—*J. O. B.*

LEAVES OF RHUBARB.—I learn from H. G. Glasspoole's interesting paper on "The History of Rhubarb," that the leaves of that plant were formerly eaten as a vegetable. Will one of the readers of SCIENCE-GOSSIP kindly tell me of a good mode of preparing and cooking them as such?—*A. M. P.*

NOTES OF FROGS.—We have been passing the winter at Biarritz, and often in our walks in the neighbourhood we have heard a noise like the tinkling of many sheep bells. This noise, some people told us, was produced by a toad, and others by a frog; as both these reptiles abounded in the hedges, it was difficult to ascertain from which the noise really proceeded. Can any reader of the SCIENCE-GOSSIP inform us if the pretty, cheerful sound was made by a frog, or a toad, and how the noise was produced?—*V. G.*

INDIGENOUS MEDICINAL PLANTS.—I should be grateful for any information regarding localities of the Indigenous Medicinal Plants, in the ancient district Cumbria; for identification only, none will be removed.—*J. Foster.*

STOCK-ICE.—In SCIENCE-GOSSIP for June a correspondent states that in certain frosts the bottom of streams and "broads" in Norfolk will freeze, and at the giving of the frost a substance something like ice-cream in appearance will come to the surface, to which the local name of "Stock-Ice" is given. During a severe winter which I spent many years ago in Germany, I observed the phenomenon of water beginning to freeze at the bottom instead of the top—this occurred in one of the mountain-streams flowing into the Neckar. I have not witnessed it since, nor have I met with any explanation or mention of it, but I thought at the time, and have since assumed, that I had hit upon the true solution. Water, when in a state of agitation, does not freeze so readily as when it is still. The stream at its surface was in rapid motion, but at the bottom there were recesses where the water was nearly, if not entirely quiescent. Here, as the temperature of all the water, and the containing channel was far below the freezing-point, crystallisation was able to begin. The process was possibly assisted by the presence of objects serving as a nucleus, but I did not observe this, nor am I aware whether the formation of ice is promoted by such means, but the ice remained at the bottom in flocculent masses, and may have been attached to the channel by something round which it had formed. I should add that lower down the valley an overshot mill was completely draped with curtains of icicle, which had accumulated till the wheel was completely stopped. It may be said that there the water, though in motion, had frozen. I imagine, however, that where water is already below 32° Fahr., and is only kept from freezing by motion, some very slight change of conditions is sufficient to turn the scale and to cause the process of crystallisation to set in. I shall be glad if some of your scientific readers will give their views on the facts stated, and my suggested explanation of them.—*J. Hannen, Offham, Lewes.*

DUTCH CLOVER.—In our neighbourhood, Clevedon, Somerset, I find this year an abundance of the Dutch clover (*T. repens*), with flower heads in various stages of transformation or reversion to leaves. The petals, and sometimes the carpels, are quite green and trifoliate shaped, exactly like miniature specimens of the ordinary leaves. *Trifolium hybridum* shows the same tendency to monstrous growth this year. The excessive rainfall is suggested as a cause. —*W. E. Green.*

ARUM MACULATUM.—A little girl, six years of age, died this week in the neighbourhood of Liss, from the effects produced by eating the spadix of the arum. The child's mother was working in a hop field, and took the little girl to help her, as she expressed it, "out of harm." The child went to pick wild flowers, and finding some "lords and ladies" ate several. She became ill, and after lingering for some days died in great agony, medical aid not having (I believe) been sought. I did not hear of the case until after the little poor sufferer's death, and then it was only incidentally mentioned, that "a child had died from eating arum flowers." Country people are so sadly ignorant of the poisonous properties of our native wild plants, that I am surprised more deaths do not occur.—*Mrs. Alfred Watney.*

NATTERJACK TOAD.—In reply to Mr. Perrycap's query, I found the natterjack quite an interesting pet and easily kept. I had him in a small fern case, in a corner of which he took up his abode, scratching a hole in the soil, in which he sat with his bright eyes on the look-out for any insect or worm thrown to him. When a worm was given to him he stood over it much like a terrier over a rat, and with a snap soon made an end of lumbricus. If the worm was large and struggled violently, he assisted it into his mouth with his *hands* (or hand, as he had at an early age lost one). Insects he generally caught by a rapid stroke of the tongue, but he declined any that were dead; in the winter, when insect food was scarce, I fed him on little pieces of raw meat, which he readily took if they were gently moved as if endowed with life. When in the possession of his former owner he once made a meal of a young snake, eight inches long (see SCIENCE-GOSSIP for 1873, page 93). He was also fond of a bath, and would sit for hours at a time in a little pan of water placed in the case beside him. He got so tame that he would come to my hand, into which he would crawl to be taken for an airing through the house, catching the flies from off the walls. Last year "Diabolus" (a name given him by a lady friend of mine) did not seem so lively after his winter nap, and his tongue seemed to have lost its cunning, and he with difficulty took any food, till one morning I found him dead in his corner. He was about ten years in confinement, and probably died of old age. If Mr. Perrycap wishes any further information I shall be glad to give it if he sends me his address.—*J. M. Campbell.*

BOOKS ON BOTANY.—In the article on "Books on Botany" in the August issue I find two mistakes. According to the latest catalogues that I have seen, the two volumes in Collins's Advanced Series by Prof. Balfour are not yet published, and the translation of Le Maout and Decaisne is 31*s.* 6*d.* not 52*s.* 6*d.* Thorne's "Botany," also, is not a book on a special branch, but a general text-book, though not on the usual plan. I think the idea of lists of suitable books for students a good one. Brief lists, more compressed on account of space, might guide students in their choice.—*A. Wheatley.*

REGISTER OF WORKING FIELD BOTANISTS.—It has often occurred to me what a useful thing would be a register of working field botanists, similar to that of entomologists, published some years ago by Mr. Stainton. There must be in every place at least one working botanist who would be glad to place his name on such a register as willing to help strangers by affording information as to the local flora. I have just again been reminded of this by a botanical visitor to this town, whose acquaintance, to our mutual regret, I only made a day or two before he left. Had there been such a register, we might have had many pleasant rambles together. If I might suggest such a thing, I should think a list, alphabetically arranged as to towns, and published annually, say as a supplement to SCIENCE-GOSSIP, and for which some small fee could be charged, would meet what is required.—*Arthur D. Melvin.*

ROBBERIES OF KESTRELS.—Many readers of SCIENCE-GOSSIP must lately have noticed a series of letters in the newspapers in which the amount of good and evil done by our birds of prey is made the object of discussion. Much of the correspondence consists of examinations into the kestrel's claims to a good character, and it must be confessed that the bird has not come out of the affair quite so honourably as we would have wished. It is certainly ungracious in the kestrel, while his friends are defending his reputation for good behaviour, to frustrate their kind endeavours by carrying off young chickens and pheasants to his nest, where the remains must be discovered by the first unfeathered biped who chooses to pay him a domiciliary visit. But the reports of these discoveries in the *Standard* are only too conclusive, even if we had not evidence nearer home. In this neighbourhood many chickens lately disappeared. A hawk's nest close at hand, being fired into on suspicion, was brought bodily to the ground, and proved to contain two young kestrels and a dead chicken. This is only a unit added to the list of misdemeanours decisively "brought home" to the kestrel during the present season. Unusual events have not been scarce this summer, and in few cases have attempts been made to account for them, somehow or other, by the "lateness of the season." It is worth inquiring whether the windhover may not fairly claim this excuse for his singular violation of the trust which naturalists have always placed in him. The fieldmouse being the staple food of the kestrels, it is presumably the chief diet in ordinary seasons of the young birds in the nest, and as the cornfields are the usual habitat of this animal, it must be on these that the young kestrels depend in great measure for their subsistence. In this county (Wexford) where the bird is very common, I have observed that it seems to take complete possession of the fields as soon as they are reaped, scarcely a stubble being not daily visited by it. It then presents a noble contrast to the sparrow-hawk, which hardly ever shows himself in such localities. When the young kestrels are fledged, which does not take place till the harvest has made considerable progress, the families repair *en masse* to the stubbles, and must then do an incalculable amount of good. But this year the bird is in a predicament. The young are in the nest, and must be fed; but though August has begun, the corn scarcely shows signs of ripening, and reaping is as yet out of the question. Even the sharp eye of the kestrel is unable to detect its prey among the green waving fields of oats and barley, which everywhere greet the eye, and it is not wonderful after all that it should turn elsewhere to seek its food. In such a state of things it occurs to me that our friend must be even a worse depredator than that notorious robber the sparrow-hawk. For the mouse-hunting instinct of the former teaches it to seek its prey only on the ground, and thus, in the absence of mice, the number of pheasants, partridges, and chickens, which fall into its grasp, would probably be much greater than would be carried off by the sparrow-hawk, which seizes its victims indiscriminately from the ground or from the branches of trees, and often chases them on the wing for considerable distances. If these conjectures are right, the general character of Tinnunculus remains unimpaired, and only for the present summer can he be considered a public enemy.—*C. B. M.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

H. H. (W. Ashling).—Your mint is a form of *M. arvensis;* it approaches *M. agrestis* very closely. The other is *Calamintha sylvatica*, it is too diffuse for *C. menthifolia.*

M. M. C. C. S. (Somerset).—The specimen you enclose is the snowberry *(Symphoria racemosa)*, a North American shrub, not uncommon in cottage gardens. We have no doubt whatever it is the plant called snowdrop tree by your Welsh correspondent; we have heard it named snowball, snowdrop, and snowberry.

J. G. G. (Chipperfield).—We have done our best by microscopical examination, to find out the cause of the discoloration; the cells are devoid of chlorophyll, still the leaf is uninjured, and has evidently not suffered either from insect or fungoid growth.

C. VANCE SMITH.—You can get living marine zoophytes, &c., from Mr. T. McGann, Gortaclare, Burren, Ireland; and weekly supplies of living microscopical animals from the excellent studio of Mr. Thomas Bolton, 17 Ann Street, Birmingham. Many thanks for your beautiful slides.

JOHN PLATT (Nantwich).—We have received the shell you say was one of several which came from a girl's ear. It is the upper part of an empty *clausilia*—a common shell on hedgebanks and moss. The girl must have been lying on the grass, or else have put the shells in her ear, as children often do put such things. It is utterly impossible the shells could have lived in the girl's head, and they certainly had not been in her ears long before they came out.

E. D. BAYLEY.—Thanks for your specimen of rose in which two buds are growing together by their calyces.

J. A. W.—Lindsay's "British Lichens," published by Routledge, at 7*s.* 6*d.*, with coloured plates, is a good introductory book.

W. PURVES (Callander).—See articles on "The Preparation of Insects for Microscopical Examination," in SCIENCE-GOSSIP for May and June of the present year. Also chapter in "Collecting and Preserving Natural History Objects," published by D. Bogue, 3 St. Martin's Square, London, price 3*s.* 6*d.*

R. A. BULLER.—The "crystalline cases" attached to seaweeds, are the egg-cases of some mollusc, perhaps of a species of Natica. The "growth" attached to underside of walnut leaf are the stalked eggs of some insect. In many respects they resemble those of the lace-wing.

H. H. BROWNE.—We have not as yet received any box containing the wild flower you mention.

W. K. (Leeds).—We sent off your specimens to a gentleman to be named, and he has unfortunately mislaid them. Please send us others.

J. W. WILSON.—You will find details of the genus acarus, in Boisduval's "L'Entomologie Horticole," also a good synopsis in the "Micrographic Dictionary." Westwood's "Entomologist's Text-Book," will supply you with details of the genus Atropos.

S. BOXFORD.—See note on "Reptile Vivaria" in SCIENCE-GOSSIP for 1878, page 38; also details as to reptiles in confinement, in SCIENCE-GOSSIP, vol. iv. page 272. A description of a "Reptile Vivarium" is contained in SCIENCE-GOSSIP for 1876, page 266.

EXCHANGES.

WANTED, a little sand or dredgings containing globigerina. A liberal exchange in double-stained vegetable tissues in return. —Charles Vance Smith, Carmarthen.

WANTED, well-mounted slides (dry) of all the Pleurosigmata, in exchange for physiological and others. Lists to M. Fowler, Burn Row, Slamannan, N.B.

A GOOD triple nosepiece and a pair of stage forceps, in exchange for a really good one inch and a fair quarter inch objective.—T. S. Harrison, The Laboratory, 31 Scale Lane, Hull.

FOR mounted slides of *Podura curvicollis* or *Degeiria*; send other slides of interest.—T. Forty, Buckingham.

THREE and a half volumes of the "Intellectual Observer," unbound, and all the Lepidoptera I take this year for fossils or books.—J. A. Floyd, Alcester, Warwickshire.

WANTED, microscopic apparatus or books, for a complete set of "Grevillea."—C. Weeks, Torquay.

TEETH, cartilage, &c. (unmounted), from Slamannan coal measures, make good slides, showing structure, for other unmounted material. Send lists to M. Fowler, Burn Row, Slamannan, N.B.

LAND and fresh-water shells, taken in Yorkshire for those of other counties. Address, H. Pollard, Philosophical Hall, Leeds.

FINE specimens of Batis, Derasa, Diluta, Hepatica, Brunnea, Nebulosa, Ziczac, Jota, Albicillata, and others. Wanted good British eggs, or marine shells.—Thomas H. Hedworth, Dunston, Gateshead.

SILURIAN corals and brachiopods, good specimens named and unnamed, in exchange for other fossils.—F. Ashton, 46 Lingard Street, Moss Side, Manchester.

WANTED, the "Gamekeeper at Home," by the author of "Wild Life in a Southern County," in exchange for Hayward's "Botanist's Pocket-book."—Indus Villa, Livingstone Road, Havelock Park, Southsea, Hants.

SLIDES of *Phthirius pubis* (human crab louse), in exchange for other parasites. Send lists to A. W. Stokes, Laboratory, Guy's Hospital, S.E.

WANTED, 46, 103, 119, 170b, 511, 559b, 678b, 730, 757c, 828, 933, 992b, 1057b, 1081, 1139b, 1222, 1227b, 1228, 1266, 1279, 1286, 1298, 1347, 1410, 1457, 1582b, 1669, 1670, 1671, 1673, 1674, and 1678, for *Potamogeton Zizii*, M and K.—Andrew Brotherston, Shedden Park Road, Kelso, N.B.

LARVÆ of Bucephala, Filipendula, Salicis, and Chrysorrhœa, also British plants for larvæ and pupæ.—Tunley, 7 Albert Road, Southsea.

WANTED, Kentish books, deeds, and guides—or rubbings of monumental brasses, from any county. Exchange natural objects, fossils, ferns, seaweeds, &c.—F. Stanley, Margate.

"NATURE," complete, 19 volumes, beautifully half-bound, rest of numbers up to date, in exchange for binocular microscope. Address, Alfred Tozer, Jackson Row, Manchester.

WANTED, for a consideration, live reptiles, British or Foreign. —J. M. Campbell, Kelvin Grove Park, Glasgow.

FINE collection of well-preserved U. S. plants, about 1000 species, including grasses and ferns. Wanted, works on Entomology, botany (specially cryptogamic), or offers.—Address, care of Editor.

WANTED, good micro material, prepared or in the rough—Foraminifera, Polycystina, Spicula, Diatoms, E. spines, &c., for first-class slides.—James Green, the Cross, March.

HORNETS AND WASPS (living ones preferred) wanted in exchange for first-rate insect preparations. Please write, before sending any insects, to E. S., 24 Grummant Road, Peckham, S.E.

S. LACUSTRE, *P. nitidum, P. pusillum, N. fluviatilis, L. glabra, P. involutus, L. involutus*, and other shells, in exchange for numerous desiderata. — Henry Laver, F.L.S., 1 Trinity Street, Colchester.

BOOKS, ETC., RECEIVED.

"Smithsonian Report, 1877." Washington: Government Printing Office.

"Wild Flowers worth Notice" (new edition). By Mrs. Lankester. London: D. Bogue.

"Manual of Bee Keeping." By John Hunter (3rd edition). London: D. Bogue.

"Greenhouse Favourites." Part iii. London: Groombridge.

"Proceedings of Liverpool Naturalists' Field Club, 1878-9."

"Journal of Quekett Microscopical Club." No. 40. London: D. Bogue.

"Midland Naturalist." August.

"Land and Water."

"Ben Brierley's Journal."

"Journal of Applied Science."

"Feuille des Jeunes Naturalistes."

"Science News." July, August.

"American Quarterly Microscopical Journal." No. iv.

"American Naturalist." August.

"Bulletin of the Essex Institution." Vol. ii. nos. 4, 5, 6.

"Bulletin de la Société Belge de Microscopie." No. ix.

"Annual Report of the Goole Scientific Society, for 1878-9."

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 10TH ULT. FROM:—J. F. R.—J. S.—T. F.—B. H.—G. N.—D. K. B.—C. W.—T. V. D.—F. V. P.—J. W. S.—W. W. I.—S. B.—H. W. F.—W. H. D.—J. B. B.—J. S. S.—J. C.—W. W.—R. B. B.—C. F. W. T. W.—J. S. H.—C. V. S.—G. H.—C. B.—J. P.—J. H. W.—A. W.—W. J.—C. H. D.—W. M. P.—E. D. B.—R. H. W.—F. A.—W. W.—H. P.—C. B. M.—T. H. H.—R. A. B.—W. A. K.—M. F.—A. W. S.—E. G. H.—J. F.—A. B.—S. M.—B. H.—J. A. W.—H. B.—E. S.—D. H.—S. B.—R. T.—W. P.—F. S.—W. S.—F. C. K.—W. E. G.—W. H. T.—J. M. C.—J. S. H.—H. B.—B. B. S.—G. H.—M. H. R.—C. D. S.—J. T. M.—T. H. A.—A. P.—A. T.—W. H. N.—&c.

LICHENS, AND A POLLUTED ATMOSPHERE.

DURING the spring of the present year, I was very much struck with the disastrous effects of a deleterious atmosphere on the growth of lichens. At the same time, I felt very forcibly the confirmation of the fact that these humble plants, so beautifully covering nature's less graceful parts, as well as pioneering a higher vegetable growth, are themselves aerial plants. What the water with its solutions is to the Algæ, so the air with its chemical substances is to the lichen.

If the latter fed and nourished its growth through its rhizinæ or from the matrix, we should be at a loss to understand the utter obliteration of plants in the same circumstances which once flourished in fruited luxuriance. Growing with other plants in the same place, if it nourished itself in the same way, we should naturally expect the lichen to hold its own with its fellows, subject, of course, to those changes which come alike to all vegetable life; but it is not so. The lichen will entirely disappear from a spot without any observable change in the other vegetation around, and that from a pollution of the air which is not sufficient to affect those plants which nourish themselves from the soil or matrix of growth.

In Winch's "Flora of Northumberland," published in the Trans. Nat. Hist. Society of Northumberland and Durham, 1832, mention is made of a number of lichens growing in the woods at Gibside, Durham. Amongst the plants enumerated is *Evernia prunastri* (L), said to be in fructification in Gibside Woods. As I have never had the pleasure of gathering this species in fruit in any part of North Durham, or the west and south of Northumberland (which I have more or less searched), I went out to Gibside in the spring to see if I could find the above lichen. Gibside is some seven miles from Newcastle to the south-west. The hall is beautifully placed on the Derwent. The surrounding woods run back on to Whickham Fell. On the latter I found one or two forms of Callema, and what seemed to be *Peltigera malacea*, but it was not in fruit, and a few of the commoner forms of Lecanora and Lecidea. Gibside Woods, barring the atmosphere, are favourable enough for the growth of fructiculose and foliaceous lichens, but for any of these forms I searched them in vain. Not a trace of the series Ramalodei could I find. The trees were as barren of Usnea, Ramalina, and Evernia as if they had never known them, and I might say of almost every other form. I found here and there on an old fir a few barren patches of the thallus of some Calicium, and I noticed a few forms of Lecanora and Lecidea by the river side.

The lichens which flourished here in the fine condition spoken of by Winch have perished, and this evidently from the pollution of the atmosphere by the smoke and fumes from the Tyneside, and the collieries of the surrounding district. Though these are a considerable distance from Gibside, yet the deleterious elements travel on the wind, for the trees have that dusky coating on their trunks and branches which is peculiar to trees bordering a town, and which is fatal to lichen-growth.

Gateshead-on-Tyne. W. JOHNSON.

SKETCH OF THE GEOLOGY OF HAYES COMMON, KENT.

By GEORGE CLINCH.

HAYES COMMON is pleasantly situated in one of the most beautiful parts of West Kent, about two miles from Bromley. It is bounded on the south and west by valleys, and forms a gently inclined plane dipping to the north and north-west. The subsoil mostly consists of pebble beds, which are composed of light brown quartz sand and well-rolled flint pebbles of various shapes and sizes. These beds

form the lower part of what is geologically known as the "Woolwich and Reading beds," and they rest upon the chalk.

Their thickness at Hayes Common is perhaps from thirty to forty feet, but, owing to the absence of any sections in the central parts of the common reaching to the chalk, the exact thickness cannot be definitely ascertained. Most, if not all, of these pebbles are undoubtedly flints derived from the chalk, rolled and ground down into the form of pebbles. But the sand, which occurs with the pebbles, could not have been derived from the same source. Neither could it have resulted from the attrition of the chalk flints. The absence, moreover, of any chalky matter indicates that the sand was obtained from some other rock. My own opinion is this: during the Lower Eocene period the London basin may have received material resulting from the destruction of rocks in the Wealden area. This would easily explain the origin of the sand on Hayes Common; and I am the more inclined to believe in this theory from having frequently observed in the immediate neighbourhood small pieces of worn ferruginous sandstone, such as is very abundant in the upper greensand at Sevenoaks and other places. Sir Charles Lyell, in his "Elements," expresses it as his opinion, that "contiguous parts of the sea were sufficiently deep to receive and retain the matter derived from that waste," (i.e. the denudation of the weald).

The water by which these beds were deposited, appears to have been subject to a variety of currents, giving rise to what is known as irregular bedding; and from the general character of the beds, it seems probable that they were thrown down upon a kind of beach which was continually rising. In one or two instances, however, I have met with *diagonal bedding*, and the dip of the laminæ in these cases was toward the east.

I may note here that the "Thanet sand," which is the lowest member of the Lower Eocene rocks, is not present in this part of Kent, although it occurs in considerable thickness in Mid and East Kent.

At the base of the pebble beds a thin stratum of clay occurs, inclosing unworn green-coated chalk flints. Upon the surface a thin band of peat, of from two to eight inches thick, has been formed by the dense vegetation of furze and heath.

No fossil remains of any kind have been found in the pebble-beds proper of Hayes Common; but the writer has frequently found shells characteristic of the "Woolwich and Reading beds," in a bed of clay situated at the south-eastern extremity of Hayes Common, and exposed in section at Coney Hall Hill. Some time since, a skull (in a rather perfect condition) of the *Bos primigenius* was found in the gravel occupying the bottom of a valley in the immediate vicinity.

Perhaps I ought to mention, as an interesting fact in connection with Hayes Common, that recently a large number of pits have been noticed which are supposed to be the remains of British "pit dwellings." The writer, having found worked flints on the common, was led to open one of these pits (December, 1878), but nothing of importance was found. Before long, it is hoped, other pits will be opened, and thus some knowledge gained of these interesting remains.

Deposits of pebble-beds, similar to that at Hayes, are frequently met with in West Kent and Surrey; and their presence is usually betrayed by the peculiar vegetation which they support. We must not, however, infer that these deposits were once spread over the entire surface of the country. There is good reason to believe that the general features of the country in this neighbourhood remain the same now as when originally deposited and left by the retiring sea.

It will be seen, therefore, that the geological features of Hayes Common, although lacking in anything of an unusual nature, are not, at least, destitute of some interest, and may, after all, teach the young student of nature some facts worth knowing.

ORNITHOLOGICAL ESSAYS.

No. II.—Sparrowhawk (*Accipiter nisus*).

By Tom Wm. Dealy.

Birds of prey form so conspicuous a position in our mountain landscape, that it is no wonder they do not thrive. Shot at, and entrapped by keepers, who have every incentive to wage war *à outrance* against these bold depredators, who wonders at their decreasing numbers? Any winged "vermin" which darkens the zealous keeper's path has but small chance of safety. Rewards are offered him for their heads and limbs; collectors and dealers tempt him to risk his huge form in clambering over precipitous rocks, and gaining dizzy eminences, that he may approach their well-nigh inaccessible eyries. Indeed, when we enumerate the numberless difficulties this tribe of birds has to contend with, our astonishment is that any remain.

Conspicuous among this persecuted family is the subject of this essay. It is one of the short-winged hawks. Most of the members constituting the family Falconidæ may be termed courageous, and are particularly eminent for their bravery and noble carriage; but the sparrowhawk carries with this a degree of impudence and daring which makes it the universal terror of the smaller of the feathered tribe. Many are the stories current of the bold, fearless daring of this hawk—of dashing through glass in impetuous pursuit of its intended victims; of chasing them into rooms, compelling them to take refuge in unlooked-for places, such as flying to man, claiming from him that protection which they cannot find elsewhere. One poor bird, I remember, "took sanctuary"

in the bosom of a lady. When giving chase to its prey, it has been known to dash itself against material objects with such impulsive force as to occasion instant death. I must crave the reader's indulgence in relating the following incident. It shows the remarkable audacity of this bird, and as it is taken from a paper which few of your readers see, I think I am not wrong in introducing it here. "A hawk must live, and many strange tales are told of its powers of flight in chase of its prey. A little incident was witnessed by some gentlemen who were driving through Bickerton lately, which well illustrates its daring when goaded by hunger. The bird was observed for some time. For a period it steadied itself in the air, with imperceptible motion, and then with swift descent darted down upon a rook (*Corvus frugilegus*) which had alighted on a tree. The rook, which was quite as heavy as the hawk, was carried some distance in the talons of the latter, but its weight dragged it to the ground, where the struggle for supremacy was continued; but not for long, as with sharp strokes of the bill the hawk proved itself the victor, and gorged itself with its hardly earned meal."

Yet with all this impudent courage, the sparrow-hawk is sometimes—nay, often—ignominiously put to flight. When it appears in any neighbourhood, the little birds give each other timely warning of the enemy's approach; and, as we think that "unity and combination are strength," so think the little birds, for under this impulse they unite in one body and with loudly iterated twitterings of rage and vengeance drive this pert, audacious hawk in graceless retreat from their domains. It is only by calling into full requisition its power of wing that it can make good its escape from its relentless pursuers. Even then the swiftest of them, such as swallows and others, are foremost in the attack, flying round it, uttering shrill cries of vengeance, buffeting it, and tormenting it in various ways, until they are satiated and return to more peaceful duties. Sometimes, however, the hawk will suddenly turn round on its pursuers, scattering them as a whirlwind, and with a loud shriek of blended rage and fury seize one of the bolder of its assailants and carry it off in its sharp talons for its temerity.

Should there be any starling roosts within its radii of exploration, it is sure to pay them frequent periodical visits. Charles Waterton had a starling *Sturnus vulgaris*) tower, which was occasionally visited by this daring bird. He says:—"His unwelcome visit causes a tremendous uproar. An universal shriek of terror announces his detested presence; and scarcely have I time to fix my eyes upon the tower ere the intruder is off with a starling in his talons."

All the farmyards within a certain distance of its eyrie are well known. It knows to a near guess where a morning's meal is to be procured. It knows which farmyards are well stocked with poultry, and which are not. If there be any preserves of partridges or pheasants in its vicinage, it will acquaint them with its presence. It levies frequent contributions on all—farmyard and preserve, poultry and game—with a degree of regularity which demonstrates conclusively its effrontery.

This hawk is more abundant than it would appear to be, owing to its shy, wary, restless disposition, which necessitates it to shun man's society, and seek rather the deep solitudes and quiet seclusion of the most tangled retreats of the forest. As the hobby (*Falco subbuteo*) has been called a miniature peregrine (*Falco peregrinus*), so in like manner has the sparrow-hawk been not inaptly termed a diminutive goshawk (*Astur palumbarius*), to which in form it bears some resemblance.

It sometimes perches on the top of a decayed tree or a hedge stake, alighting very suddenly. Its position is very erect, its mien determined and active, and its small head is continually moving about, directing, with searching vigilance, its small keen eyes on all sides in eager search for prey. Its power of sight is very great. It often soars to a great altitude. This cannot be to look for food, the height being such as to preclude the possibility of prey being discerned—keen though its sight—from the elevations often attained. It is doubtless a sense of exuberant happiness and unconcealed joy. Its aerial evolutions, notwithstanding the comparative shortness of its wings, are not altogether devoid of graceful movement as it glides through the higher regions, making circles of more than ordinary diameter with great beauty and effect. It often takes protracted and extended flights, which are apparently executed with every facility, The interior of dark, thick woods of fir or pine appears most suitable to the temperament of this impulsive bird.

A fir forest, on a rugged fell-side, with a stream running through in tortuous passage, is a sure haunt of this bird. It sweeps over the canopy of rustling leaves with quick motion, and, suddenly shutting its wings, drops on some decayed tree; there to rest, or to wait with expectant, vigilant eye and patient perseverance the appearance of some unwary bird, upon which it flies up from its resting-place and gives instant chase. The figure of this hawk is very slim and elegant; its whole contour fitting it for a bold, daring, freebooting existence. In fact, its life is essentially one of continued action and exertion, of marauding expeditions, of ceaseless plunder, and deeds of piracy. Indeed, this bird is a pirate among feathered creatures, the tyrannical despot of the woods, a rover, a pillager, and a plunderer. It shoots through the air like a passing meteor—dark and mysterious—and, as a flash of heavenly light, dashes itself upon its poor, luckless victim, which, by varied intricacies of flight and ever variant manœuvres, endeavours to evade the sharp talons and mortal clutch of its savage pursuer. One moment, and we behold

it hovering in beautiful flight near the surface of the earth, while in the next we see it, with increasing rapidity of wing, ascending higher and higher, until it arrives at a dizzy height, and there circling with varied and beautiful curves, its piercing eye beholds the illimitable expanse below. But suddenly, with closed wings, as a thunderbolt from the quiver of mighty Jove, as the passage of light through space, it descends with inconceivable velocity, down to the less pure regions below, until it seems that it is about to precipitate itself to certain death on the earth; but no! with expanded wings and broad tail, with a shrill, rapturous cry of exultation, it dashes into the interior depths of the wood. What more fine than the bold flight and wild freedom of this bird!

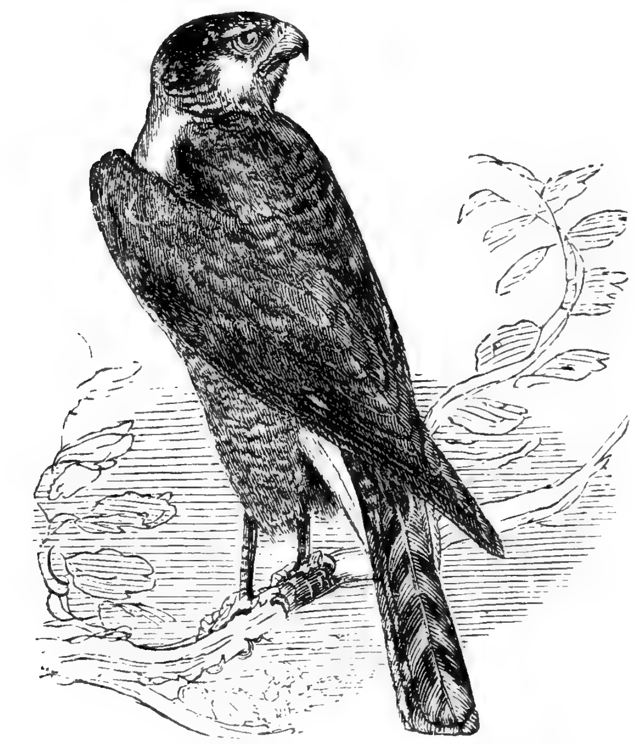


Fig. 166.—The Sparrowhawk *(Accipiter nisus).*

Let us examine the sternum of this hawk. Look at it, and mark the depth of the keel, and we see clearly indicated great power and extension of flight. Those who have frequented the haunts of this bird must have observed how suddenly it stops in its rapid onward course, and how instantly it alights. Its lofty, protracted evolutions in atmospheric regions and its almost untiring wing evince its buoyancy and lightness, while the impetus with which we have often observed it descend denotes plainly that it likewise possesses an amount of density. However inconsistent and illogical this may sound, it is nevertheless true. It is no illusory theory. It is a well-known established fact, and facts are stubborn obstacles to overcome.

It is pleasant to think of this bird in conjunction with the wild localities it frequents. Our rambles through the dark, gloomy fir forest, or on the rocky slopes of the North, give us abundant opportunities of observing it in all its wild and distinctive characteristics.

Gamekeepers see no beauty in the flight of hawks, or in their wonderful instinctive passages to other climes, or in the rapidity and grace of their heavenward movements. Their sole object, their only desire, is to see their preserves well stocked, and to know that they have rid the neighbouring woods of all "vermin"—for such they designate all birds and

Fig. 167. –Head of Sparrowhawk.

Fig. 168.—Foot of Sparrowhawk.

animals which stand in the way of their darling projects. The sparrowhawk's supply of food involves a question of great import to the keeper, and is worthy of more than passing consideration. All look upon this bird, as well as all other birds bearing the appellation of "hawk," as an enemy, and a hindrance to their object of rearing game, and thus exert every influence to exterminate it. And yet, were it possible to write an exact account of this bird's sustenance, say for a month, and elucidate the results, the rough owner of velveteen, little though he may know about the arts of ratiocination, would be surprised. But it is useless arguing with such, it is an unnecessary waste of so much vital force and energy. If, however, they were to study more deeply, and examine more carefully, the habits of this and other birds, they would find all

their reputed arguments fly as chaff before the winds, melt away into nought as the mist before the genial rays of the sun, in the light of the incontrovertible facts they would obtain. They would illumine the prejudices of their darkened illiterate minds. Their "museums" would be empty, and they would become practical ornithologists, then enabled to behold with delight the combined grace and elegance of the movement in mid-air of the birds which before they saw but to shoot. And what is more, their preserves would be stocked with healthier birds.

Were keepers to proceed in a proper manner, they need experience no fear from hawks, and their woods would be filled with finer game. Farmers would not have to employ lads to frighten away sparrows (*Passer domesticus*) and other birds from destroying the ripening grain. The sparrowhawk, nature's own gift, would more effectually do this. Why is it that such birds as sparrows (not, indeed, that I proclaim the ban of extermination against them, because, without doubt, in reasonable numbers they are beneficial in their way) are so superabundant? We need not look far for a reply. The balance of nature is disturbed, nay, her equilibrium is upset, and behold the consequence, witness the result. Granted that the sparrowhawk does occasionally feast on game, that it sometimes makes a meal off a chicken. Frighten it with a blank charge, restrain it in this habit. If you leave your house unguarded, will not the burglars enter? Watch it, and it will soon cease to reiterate its visits. Or, if it does come, it will confine itself to the hosts of noisy sparrows which usually congregate in the stackyard. And what if it does on rare occasions feed on a partridge (*Perdrix cinerea*)? What if it flies off with a young pheasant? Who is there who will shoot the wary fox, even though he steals a whole tribe of geese and ducks? All that is required is watchful care and vigilant attention. Keepers of the woods, divest yourselves of selfish prejudice, or the wrong will recoil on your own heads. Learn to study the economy of this bird, and you will find that most of the stolen game you attribute to a winged thief has been taken by a weasel or a fox, or other of the four-legged tribe which inhabit the recesses of your domains.

(*To be continued.*)

THE HISTORY OF THE APPLE-TREE.

By H. G. Glasspoole.

THE early history of the apple-tree is very ancient, connected as it is with so many legends of remote antiquity. In former days this tree was supposed to have been the tree of knowledge, to whose fruit may be traced all the miseries of mankind, and our first mother, Eve, is generally represented, in the pictures of the temptation, holding an apple in her hand; this is not, however, particularised in the Bible. The apple is only mentioned five times in the Scriptures, and it is a disputed point if the fruit referred to was the same as the apple of the present day. The climate of Palestine is unfitted for the cultivation of this tree except in the higher regions. In the mythologies of the Greeks, the Scandinavians and Druids, we find the apple-tree mentioned. The golden fruit of the Hesperides, which it was one of the labours of Hercules to procure, in spite of the fierce dragon that guarded them and never slept, were said to be apples, though modern writers suppose them to be oranges.

The Thebans used to offer apples on the altars dedicated to Hercules, a custom derived from the following circumstance: on one occasion the river Asopus overflowed its banks to such an extent that it was found impossible to bring a sheep for sacrifice across it, when some youths, recollecting that the Greek word "*melon*" signified both sheep and an apple, stuck four wooden pegs into the fruit to represent legs, and brought this vegetable quadruped as a substitute for the usual offering, after which, the apple was always considered as especially devoted to Hercules. The late Mrs. Bayle Bernard, in her work on our common fruits, gives the following amusing description of the Scandinavian legend of the apple; after having spoken of the Eastern story of the forbidden fruit, she says: "When we come to the cold Norse regions, far from the land where the citron blows, we can have no doubts as to the real pippinism of those apples of immortality kept by the fair Iduma, by regaling on which, the gods of the Edda were wont to renew their youth; the wicked Loke stole and hid away both the maiden and her fruit, leaving the bereaved divinities to pine away, losing their vigour both of body and mind, and neglecting the affairs of heaven and earth until mortals deprived of celestial supervision, fell into all manner of evil; and it almost happened that for the want of an apple the world was lost." Well was it, that at last, summoning all that remained of their expiring energies, they succeeded in forcing the robber to restore those precious pomes on which the welfare of both realms depended.

Leaving the realms of fiction, and the mythological tales of the ancients, let us turn to those accounts which prove that this fruit is one of the most ancient on record. Dr. Heer states that carbonised apples and pears have been found in the Lake dwellings discovered at Concise in Lake Neufchâtel and other similar localities in Switzerland. Apples were more numerous than pears; both are of a small kind, but resemble those which still grow wild in the Swiss forests. However, specimens have occurred which are of a larger size, these were probably cultivated. (Sir John Lubbock, "Prehistoric Times.")

Greece in ancient days, we are told, produced most excellent apples, the island of Eubœa enjoyed an extraordinary reputation for this fruit (see "Athen."

i. 2). Philip of Macedon and his son, Alexander the Great, were so fond of apples that these were placed on their tables at every meal.

Whether the Greeks used to indulge in eating too many apples at their marriage feasts, or that a rare and expensive kind graced the table, cannot now be determined; but it is certain from Strabo that the Athenian lawgiver, Solon, made a decree prohibiting the bridegroom at any rate eating more than one, on such an occasion. Whenever the Romans extended their arms, they availed themselves of the choice fruits of the conquered countries, and the great generals who brought them to Rome, took pride in giving them their own names, as in memory of some great event or service they had done for their country. Thus the apple-tree met with a favourable reception, and was cultivated with great care, for Pliny states that there were many apple orchards near Rome that let for the yearly sum of 2000 sesterces, which is equal to £12 10*s.* of our money, and some of them, says this author, yielded more profit to the owner than a small farm. The art of grafting, in whatever way it may have originated, was known and practised by gardeners at a very early period. Pliny particularises the quince apple that came from a quince grafted upon an apple stock, which, he says, smells like a quince, and were called Appian, after Appius, who was of the house of Claudian, and the first who practised this kind of grafting. "Some apples," says Pliny, "are so red that they resemble blood, which is caused by their being grafted on a mulberry stock." Indeed, he considered that the cultivation and grafting of fruit had reached the highest perfection in his days, for after having mentioned some extraordinary production in the art of grafting, such as the above, and also as having seen grapes, nuts, figs, &c., flourishing all on one stock (which is well known to be a physiological impossibility), he says, "I cannot see how men can devise to proceed further, and for some time no new kind of apple or any other fruit has been heard of."

The Romans possessed in Plinian days about twenty-two varieties of this fruit, known as Manlian, Claudian, Pompeian, Tiberian, and several others by such noble names, who had introduced, or produced, them by grafting. Pliny not only mentions apples of different kinds, but also crabs and wildings, which are small and sour, and for that reason have many a foul word and shrewd curse given them.

The apple appears to have been cultivated in some parts of Britain at a very early period. Whitaker conjectures it to have been introduced by the first colonies of natives, and by the Hædui of Somersetshire in particular, hence Glastonbury was named by the ancient Britons Ynys Avalla, which signifies an apple orchard, and from this the Roman name "Avalloun" of the place was derived.

The Druids, we are told, paid particular reverence to the apple-tree, because the mistletoe was supposed to grow only on that and the oak, and also on account of the great usefulness of the fruit. There is no doubt that the Romans introduced new varieties from their own country into Britain, and that they continued to exist during the Saxon period, for William of Malmesbury, an English historian who flourished in the twelfth century, mentions that King Edgar, in 973, lay down to sleep under an *ould* apple-tree, which would seem to imply the existence of cultivated kinds also.

The ancient Welsh bards were rewarded for excelling in song by "the token of the apple spray," and Gwaichmal thus sings:—"The point of the apple-tree, supporting blossoms proud covering of the woods, declares every one's desire tends to the place of his affections." (Daines's "Welsh Bards.") After the establishment of Christianity and the Norman Conquest, the monks and heads of religious houses planted orchards, and we find in the reign of Henry II. a bull of Pope Alexander, date 1175, conferring the property of the monastery of Winchcombe in Gloucestershire, and their claim on the town of Twining, with all its orchards, meadows, &c., and in a charter of King John granting property to the priory of Lanthony in the same county, is mentioned the church of Herdesley with twelve acres of land and an orchard. In the beginning of the thirteenth century Worcester had become famous for its fruit trees and the cultivation of the apple had spread over the land. Many varieties were no doubt introduced from Normandy and other parts of the continent. The oldest existing variety on record is the pearmain. In the sixth year of King John, 1205, Robert de Evermere was found to hold his lordship of Runham and Stokesby in Norfolk by petty sergeanty, the paying of 200 pearmains and 4 hogsheads (modios) of wine made of pearmains into the exchequer at the feast of St. Michael yearly.*

Mrs. Barnard tells us that the costard, an apple not often met with now, appears to have been extensively grown in the reign of Edward I., and it is mentioned in the fruiterer's bills of that monarch as pome costard. It is supposed that the itinerant venders who hawked this fruit about ancient London were first called costermongers, from this circumstance. We do not find any account of the cultivation of apples during the reigns of the monarchs of the houses of York and Lancaster, the country being in an unsettled state and so distracted by civil wars that both agriculture and horticulture were quite neglected until the time of the Tudors, when it is stated that, by the industry of one Harris, a fruiterer to Henry VIII., the fields and environs of about thirty towns of Kent were planted with fruit trees brought from Flanders to the universal and general improvement of the country. Fuller states that one Leonard Maschal, in the sixteenth year of the same monarch, brought pippins from over the sea and planted them at Plumstead in Sussex. Pip-

* See Bloomfield's "History of Norfolk," vol. xi.

pins were so called because the trees were raised from pips or seeds, and bore apples which gave them celebrity without grafting.

So important had the cultivation of this fruit become in the reign of Henry VIII., that barking of apple-trees was declared to be felony. The Nonpareil, according to the old herbalists, was brought from France by a Jesuit in the reign of Queen Mary, and first planted in the gardens of Oxfordshire.

Tusser, in his list of fruits published in 1573, states apples of all sorts are grown in this country. The best apples in Gerard's time were the queenings and pearmains, both summer and winter, with some other kinds, amounting in all to seven; but he says there are a great many others, adding that Kent "doth abound with apples of most sorts." He afterwards mentions that he has "seen in the pastures and hedgerows, about the grounds of a worshipful gentleman dwelling two miles from Hereford, called Mr. Roger Bodnome, so many trees of all sorts, that the servants drank for the most part no other drink but that which is made of apples." The quantity is such, that by the report of the gentleman himself, the parson hath for tithe many hogsheads of cider.

Gerard was a warm advocate for the cultivation of this fruit, for in his account of the apple he says, "Gentlemen that have land and living put forward, in the name of God, graffe, set, plant, and nourish up trees in every corner of your grounds; the labour is small, the cost is nothing, the commoditie is great, yourselves shall have plentie, the poor shall have somewhat in time of want to relieve their necessities, and God shall reward your good minds and diligence." The golden pippin, although not mentioned by Gerard, is perhaps one of the oldest of our native apples. It is said to have been first reared at Parham Park, which is situated on the north side of the South Downs, Sussex. The Dutch, in one of their oldest catalogues of fruits, acknowledged it to be an English apple, for they call it the "Engelsche goud pepping." Pippins were, in the time of Shakespeare, delicacies for dessert. Sir Hugh Evans in the "Merry Wives of Windsor" says, "I will make an end of my dinner; there's pippins and cheese to come;" and, again, Justice Shallow, in his invitation to Falstaff, says: "You shall see mine orchard, where in an arbour we will eat last year's pippins of my own graffing." In the valuations of the fruit trees in the gardens at Wimbleton, belonging to the queen of Charles I., there is only one pippin-tree mentioned, so it does not appear to have been very generally cultivated at that period. Phillips states that Catherine, Empress of Russia, was so fond of this apple that she was regularly supplied with it from England; and, in order that she might have it in the greatest perfection, each apple was separately enveloped in silver paper before it was packed. The beginning of the seventeenth century may be looked upon as the golden age of apples, and "orcharding," as it was then called, became general throughout the country. Lord Scudamore, ambassador to the court of France in the reign of Charles I., collected in Normandy scions of cider apple-trees, and on his return to England encouraged the grafting of them throughout Herefordshire, by which means the county was said to become one entire orchard.

The Scudamore crab, afterwards known as the redstreak, was introduced at this time, and created, we are told, quite a sensation amongst the pomologists of the period. It was a great favourite of Evelyn's, who mentions it in his "Pomona," published in 1664, as an appendix to his "Sylva." Cider was the drink in Normandy at a very early period, from which country it was introduced into England. During the reign of William III. and Anne, when there was a constant succession of wars with France, the use of cider was generally inculcated as tending to the permanent exclusion of the wines of our great rival, so that this drink became one of the chief beverages of the nation. The cider countries principally lie in the form of a horse-shoe around the Bristol Channel.

(*To be continued.*)

THE BEAR IN SWEDEN AND NORWAY.

By John Wager.

Part II.

[*Continued from p.* 131.]

THE surliness of the bear is proverbial; yet gruff as he is accounted, it is also an article of faith in the north that he will never do harm to a child. A remarkable instance of this good-natured forbearance was related to the present writer by a pastor of East Dalecarlia, in which locality it occurred, at a seater to which a she-bear had rambled with her two young cubs, and where the latter where joined in play by two children, to the satisfaction, apparently, of their indulgent dam. Not so, however, to the herd-girl, an older sister of the children, who, on discovering their associates, was seized with alarm, though needlessly; for as soon as she made her appearance, and the youngest child, with an accompanying movement of the hand, bid them "go away now," Mother Bruin and her little ones trotted peaceably and slowly off.

Dr. Berlin, a Swedish author, in his "Läsebok i Naturläran," tells of a bear that intruded amongst some cows that were grazing in a forest of Ångermanland, but was driven away by the little herd-girl; who, mistrusting its intention, and too inexperienced to apprehend the danger incurred, beat it with a stick. Similar cases, it is said, have often occurred in Norway; and the author adds, that such tractable bears have probably never tasted flesh. When at Transtrand, West Dalecarlia, in June 1866, we were informed by the pastor there, that two weeks previously, as a brave little girl was herding goats in the neighbourhood, a bear, despite her vigorous outcry,

seized one of her flock, and had quietly devoured its head and part of the body, when some men arriving drove him off, and shared the remainder of his meal.

The same pastor also related that during the preceding autumn, a bear, on receiving a shot which only slightly wounded him, had rushed furiously at the hunter, and rearing upon his hind legs grasped him in his fore-paws and carried him about two hundred feet, during which transit the man's toes only here and there touched the ground. The bear then laid his burden down, and as the man held his breath and feigned to be dead, his adversary presently left him with an angry growl. The hunter had sustained no injury beyond a superficial bite in the arm, and was soon ready to renew the pursuit. Some years before another Transtrand hunter had a close fight with a bear; the two combatants having for a while hold of

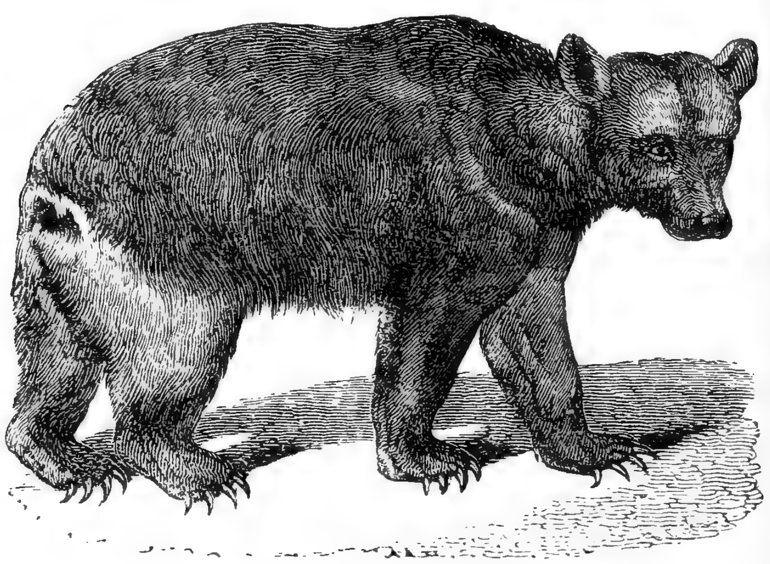


Fig. 169.—The Brown Bear *(Ursus arctos)*.

the opposite ends of a gun, but at length the bear was defeated, with the loss of his life. A militiaman, as recorded by Berlin, did not escape so scathless from his contest with a bear. Contrary to orders he had taken his musket with him to a hunt in which several joined; and as it happened the bear rushed towards the spot where he stood, at a distance from the rest of the party. The man attempted to fire, but the priming was wet, and the musket having no bayonet attached proved inadequate to repel the onset of the bear, which struck him to the ground. There he lay, holding his breath, and the bear, after several investigating sniffs, believed him dead, but sought revenge also on the musket. The soldier, thereupon, being anxious to save his weapon from injury, made a movement, but was instantly bit behind the head, so that the scalp was drawn quite over his face. He then again feigned death; whereupon the bear lay down alongside him, but other hunters arriving, the bear was presently despatched. The rescued prisoner eventually recovered from his wounds.

Man is not quite the sole subjugator of the bear; the marauding savage sometimes receives a deathblow where he only expected to dine. A Trondhjem newspaper records that during the summer of 1872, two bears came upon a herd that was grazing at a seater, in the parish of Flaa; but just at the moment when one of the brutes rose to seize a heifer that stood somewhat apart from the other cattle, a two-years' ox suddenly started from the herd, rushed with an awful bellow at the bear, and with one thrust gored him to death—ripping him open from the stomach to the neck, so that a portion of the intestines hung out. A young herd-boy, who had witnessed the fray, hastily collected the cattle and drove them to the seater-hut, where he related the adventure to the dairymaid; adding that though the bear had received a death-wound, its head was still alive. When the woman had counted her cattle and secured them in the shed, she armed herself with an axe and a staff, and bidding the lad follow with a large knife, went in quest of the bears. They found the wounded bear lying dead; but the other had departed, having first, however, almost completely covered his unfortunate companion with moss. The dairymaid, who was sixty years of age, and had spent thirty-five summers at the seaters, then stripped bruin of his shaggy coat. Perhaps it would serve to keep her warm at nights in her old age; or perhaps be presented to the church to comfort the pastor's toes in the pulpit on cold Sunday mornings; a use to which bears' skins are yet applied in Scandinavia, as they were three hundred years ago, when Olaus Magnus, Archbishop of Upsala, wrote his venerable history of the Goths, Vandals, and Swedes.

In exposing the rapacity of bruin we must not forget that he is a king, with certain divine rights within his forest domain, and therefore not without excuse in doing occasionally with tooth and nail what the lords of creation do daily with knife and fork. He has also in common with those lords, besides rapacious tendencies and herbivorous-carnivorous appetite, a trace of good-nature hid beneath his heavy, demure, and solid aspect. We have already given some proof of this assertion, and as it is but fair to look fully on both sides of a character, and to give even the blackest of bears his due, we conclude with an incident that shows bruin to be, sometimes at least, better behaved, and even more humane, than his neighbour, man. The account is derived from the "Falun Tidninger" for February 1865.

It is customary for the Laplanders with their reindeer to remove, every autumn, from their summer haunts on the mountains to the lower lands adjacent to the coast; where less snow falls, and better pasturage is found for the herds. Thus, a few years since, several Lapp families had descended with their peculiar breed of long-horns from the Sorsele fjelds, and pitched their tents on the uppermost forest-pastures in the parish of Burträck. Within this tract a bear had fondly hoped to pass his winter days in peace and quietness; and had indeed for awhile enjoyed repose in his lair under a bosky hill. Then

came the Lapps, with their dogs and deer; often pattering over his dormitory, so that he got no sound sleep night or day, and at length roused himself up and ventured out to investigate the cause of such commotion. While quietly making his observations he caught sight in the distance of a Lapp dame, in long snow-shoes, rapidly circling round her herd. She also soon became aware of some unusual object within the dusky skirts of the forest, and at length, after

Fig. 170.—Bear dragging carcase of horse. (See page 130.)

keen scrutiny, discovered that the dark mass really moved, and was no bush, but a bear. It evidently also had an eye upon herself; and being far away from the mountains, the bear's proper resort, this was a very unexpected sight; the woman being moreover in that condition which, according to superstitious belief, renders her sex peculiarly liable to the most furious and voracious attack of the bear, was seized with such sudden terror that she fainted, and fell upon the ground, where she remained insensible long after the reindeer had dispersed on the hills. The bear being less alarmed than herself, and quite as inquisitive, came forward and made close inspection of the unconscious housewife; then loosed the snow-shoes from her feet, and grasping her in his supple arms, bore her in the direction of the tent, which stood remotely, out of sight, in a dense grove of trees. He disburdened himself, however, at a considerable distance from it; and as the woman who had regained consciousness in his warm embrace remained perfectly still on the ground, the bear, after regarding her awhile, wended back to his repose. As soon as she supposed he was out of sight the woman rose, returned home, and related her wonderful adventure. Her hearers accredited bruin with great sagacity and forethought in regard to his conduct. He conveyed the woman homewards, they said, because she had approached too near his lair, an intrusion fraught with danger to himself; and he had sagely refrained from bringing her nearer to the tent lest he should be seen or heard by the men, of whose hostilities he was well aware. His wisdom and forbearance, however, availed him nothing; for the ungrateful Lapps, immediately after hearing the story, tracked him to his den, and thrust a spear into his kindly and considerate heart. They sold his hide to the proprietor of neighbouring saw-mills, who preserved it in memory of the singular occurrence.

ON PALÆOCORYNE, AND THE DEVELOPMENT OF FENESTELLA.

By George Robert Vine.

THE following paper was written more than twelve months since, but as the points raised in discussing the merits of Dr. Duncan's papers on Palæocoryne were so opposite in character to those already propounded in the "Philosophical Transactions" and in the "Journal" of the Geological Society I thought that it would be wiser on my part to wait further investigations rather than rush headlong into print, thoughtlessly or ambiguously. In the meantime I have submitted the paper to the calm judgment of the Rev. Thomas Hincks, so that I might obtain his opinion on the appendages of recent polyzoa, and also to the experimental scrutiny of Mr. G. W. Shrubsole. Other authorities have been consulted on certain points, and the amended essay on Palæocoryne is my final contribution to this journal on Fenestella. I am glad that these humble contributions have been the means of helping students of the palæozoic fauna to lay before a wider and more scientific range of readers than I could reach, the carefully collated facts, which will be of real service to future palæontologists. It is not only the polyzoa of the palæozoic seas that have been neglected, the other microzoa also deserve the careful consideration of thoughtful students.

Within the last ten years the attention of Palæontologists has been directed to certain fragments of

Fenestella, called by Professor Duncan Palæocoryne. Many of these so-called organisms were common enough, I believe, in the local collections of Scotland, but undescribed. In the year 1869, Mr. James Thomson, of Glasgow, took a fine series of these fragments to the School of Mines, in Jermyn Street, London. Being unable to obtain any information respecting them there, he took them to the Geological Society. Here they were examined by members, and ultimately they passed into the hands of Professor Duncan, who, with the assistance of Mr. Jenkins, undertook the labour of describing and delineating them. In due time an elaborate paper was read by the chief author before the Royal Society, and afterwards published in the Philosophical Transactions for 1869.

These "organisms" were called by the Professor, Palæocoryne, and an unquestionably unique classification was created for their reception.

Class	Hydrozoa.
Order	Tubularidæ.
Family	Palæocorynidæ.
Genus	Palæocoryne.

Their palæontological relationship or affinities were thus established for the time with the Hydrozoa—a class singularly unhappy to place them among. Being satisfied that the fossils should be admitted among the hydrozoa, its anatomical structure must assume the following names:

The dactylose base	= the hydrorhiza.
The stem	= the hydrocaulus.
The tentacular body	= the polypide.
The ornamented hard tissue	= the periderm, or polyzoary.
The faintly-traced genitive structures	= the gonosome.

The rest is embraced under the "trophosome." The term "hydrozome" refers to the whole.*

In his great work on the "Hydrozoa," published by the Ray Society, 1872, Prof. Allman refused to admit Palæocoryne among that class in his monograph. In his criticism on the zoological position assigned to the fossils—and relying upon the accuracy of the figures—he suggested, also most unhappily, foraminiferous relations. Some of his reasons for its rejection were given by Prof. Allman, but these had been, to some extent, anticipated by Dr. Duncan himself, for he says, "Were it not for the calcareous investment, there would be no difficulty in admitting the fossils among the hydrozoa: and had we not been able to avail ourselves of the affinities of the very anomalous genus Bimeria (Wright) the difficulty could hardly have been overcome." †

In May 1873, another paper was read before the Geological Society, and ultimately published in their journal.‡ In this paper Prof. Duncan re-states his former opinions, not more clearly, but still more positively than in the "Phil. Transactions"; and in a letter to me (Nov. 1877) he stated that he desired to hold his originally-formed opinions respecting the hydroid character of Palæocoryne till other and better evidence were furnished to prove that he was wrong.

In one of the "Memoirs of the Geological Survey of Scotland," Mr. Robert Etheredge, jun., says that the "Survey specimens clearly demonstrate that the base was not cellular, as originally stated by the describers, but that the appearance was caused by the growth of the organism over its object of attachment, a species of Fenestella." * This error of judgment, as well as of observation, on the part of Mr. Etheredge—for Palæocoryne is not a parasite—failed to convince Dr. Duncan of his error.

In December 1874, Prof. J. Young and Mr. John Young, of the Hunterian Museum, Glasgow, furnished jointly two very excellent papers on "New Carboniferous Polyzoa," and on "Palæocoryne and other Polyzoa appendages." † In the last of these papers the Messrs. Young gave fresh and original evidence, showing, by figures drawn with the *camera lucida*, the probable relationship of all the species and varieties of Palæocoryne as appendages of the fenestrate polyzoa. The discussion which followed the reading of this paper was sufficiently characteristic to prove that Prof. Duncan was not convinced, either by the logic or by the figures of the Messrs. Young. Generally speaking I can indorse the whole of the reasoning founded upon the results of the investigations of the professor and Mr. John Young; but there are two remarks—the first and fifteenth—to which I wish particularly to draw the attention of the reader. "The structures named Palæocoryne are organically connected with the polyzoa on which they occur; the tissue of the one is continuous with that of the other, the cells of the base of Palæocoryne being the cells of the polyzoon from which it springs; these so-called organisms are only one type of the processes which are given off by certain Palæozoic polyzoa. The stellate processes called Palæocoryne (*radiata*) are given off chiefly, if not exclusively, from the poriferous—more rarely from the non-poriferous—faces." ‡

I am sorry that the opposition of Dr. Duncan so far dwarfed his judgment as to allow him to assert that the Messrs. Young—whose figures proved the contrary—had mistaken pieces of Fenestella for Palæocoryne. This inappreciation of the special evidence furnished in the reading of the paper must have given a comic, rather than a scientific, interest to the discussion; and Mr. Jenkins also failed to comprehend the whole value of the facts, when he asserted that the recent polyzoa *Bicellaria tuba* "possesses an appendage superficially resembling Palæocoryne, but without its definite form and structure. This appendage is very small in comparison

* Dr. Duncan, "Phil. Transactions," 1869.
† Ibid.
‡ "Quart. Journ. of the Geo. Soc." 1873.

* Explanation 23. Scotch Survey.
† "Quart. Journ. of the Geo. Soc." vol. xxx., 1874.
‡ Ibid. vol. xxx.

with the individual polyzoon to which it is attached, whilst the base of Palæocoryne covers a large number of the individual cells of Fenestella."*

With all due respect for the observations of Mr. Jenkins on the appendages of *Bicellaria tuba*, I must differ from him entirely as to the value of his evidence. Through the kindness of Miss Gatty I have carefully examined the polyzoaries of this and other species, and also several of the hydrozoa in her splendid collection, and after the most careful scrutiny—and Mr. Hincks by his silence on this point seems to confirm my view—I cannot find anything having the least similarity to Palæocoryne. "The fossil appendages in no way resemble those of recent polyzoa or hydrozoa, either in structure, function, or use." †

With regard to Palæocoryne being parasitic on Fenestella, the statement of Mr. Jenkins seems to me to be equally unscientific. I have during the last two years examined hundreds of these so-called organisms, and in no case have I ever witnessed a single specimen, isolated or *in situ*, that would in any way substantiate the morphological view of either Dr. Duncan or Mr. Jenkins as to the parasitic character of Palæocoryne. In some of the best specimens of Mr. Young, in some of my own specimens, in those that I have examined of the late Mr. Harker of Richmond, and in many of the specimens of Mr. Shrubsole, these processes spring at right-angles from the celluliferous face of the polyzoon; they in no way interfere nor interrupt the cell arrangement of the fenestrules in any other sense than that which I shall give farther on. The cells are continued along the base of the process on both sides, as shown in the diagram sketch of Palæocoryne, Fig. 47 (SCIENCE-GOSSIP, March 1879). Sometimes these processes are crushed down upon, and they may by this means conceal, the cells, when apparently the *P. radiata* of Duncan seems to be seated upon the Fenestella; and I do not fear to hazard the statement that in no case is there a separate identity in Palæocoryne, and in no case have I found a specimen that would indicate a parasitic attachment similar to the attachment of *Diastopora megastoma* (M'Coy), one of the commonest of the parasites found upon Fenestella. Furthermore, every correspondent who has sent me specimens of Palæocoryne from his own locality, has prefaced his remarks upon the species with a doubt respecting the hydroid character of the organisms.

Such is the historical sketch of Palæocoryne. All the papers referred to are easily accessible to the student, and are well worth the attention of the general reader, who may be interested in Palæontological questions.

It must be assumed that the whole polyzoary of the Fenestella originated from some fixed spot on which an embryo had rested. The first process in the development would be a prolongation of the attachment, but what this prolongation was I am unable to say. If I call it a root, any reference to ordinary roots would be fallacious—for of primary roots I know but little. Nearly all that pass by that name are processes developed from the matured, or partially-matured frond. A primary root there must be, but this can only be studied in well-preserved specimens of *F. frutesc.* In a figure of *F. membranacea* before me the "rootlets" are processes springing from the lower and lateral portion of the conical expansion, some of which bifurcate in a most peculiar way, but at the part of the frond where we should naturally look for the primary root it is absent. There is, however, a great difference in the development of Fenestella from the root over that of the processes. Just above the true root, the formation of the fenestrules are very lax, so much so, that Phillips was often deceived by this laxness of fenestrule in his diagnosis of species. In the more general development of the polyzoary of even the same species, there is an almost perfect uniformity of fenestrule. Several of my specimens show this laxness and uniformity of fenestrule in a most beautiful manner, but many of Mr. Shrubsole's specimens that have passed through my hands show it more perfectly than any that I possess, and these remarks are founded upon the study of his rather than my own.

The polyzoary once established, the development of the colony would be carried on by ordinary processes, or by budding.

From a section of a beautiful fragment of *F. plebeia* in my possession I have been able to give an exact outline of several of the cells * and fenestrules of this species. (Fig. 202, SCIENCE-GOSSIP, p. 248, 1878.) On this particular part of the polyzoary a colony of *Diastopora megastoma* had taken up their home, and the cells were well preserved in consequence. In this specimen, the cells (or zoœcia) and fenestrules are of a regular and definite shape. On the borders of some of the fenestrules of this specimen, but not in the figured part, there are five pores on one side, and four on the other. The cells are opposite on the borders, and alternate on the whole length of the branch. Here development is by budding, and the dissepiments are originated by the lateral expansion of the zoœcium (*a*), Fig. 202. In fact, the dissepiment is nothing more than a portion of the zoœcium budding to originate another cell in an opposite direction. I want the reader to note this fact—one that I give the more prominence to now since Professor Allman has stated his views to the Linnean Society, on the perfect zooidal individuality of both the cell and the polypide: "This compound animal is composed of two zooidal individuals:

* Ibid. vol. xxx.

† Rev. Thomas Hincks' corrections of my own reading.

* Since this was written, I have been able to confirm my originally-formed views by sections of Fenestella, wonderfully preserved in the form of casts in sandstone, from the sandstones of Kirkcaldy, kindly furnished by Mr. Shrubsole.

zoœcium and polypide: on the zoœcium (or cell) devolving the functions of sexual and non-sexual reproduction; and on the polypide that of nutrition."* What are called bifurcations of the branches originate in the same way as ordinary fenestrules, with this difference only: the "budding cell"—if I may be allowed the term—instead of originating a lateral

The formation of some of the forms of *Palæocoryne scotica* (Duncan) is by a lateral expansion of what I will call "infertile" dissepiments. In some cases, as in Figs. 171 to 174, these occur on the outer branches of the Polyzoary without any disarrangement of the cells. The ornamentation of the branch is carried into the prolongation, and in Fig. 174 this seems to be

SPECIMENS OF PALÆOCORYNE IN SITU.

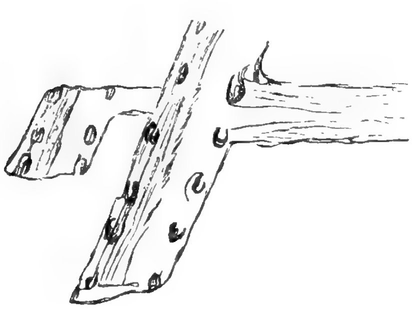


Fig. 171.—From Richmond, in Yorkshire.

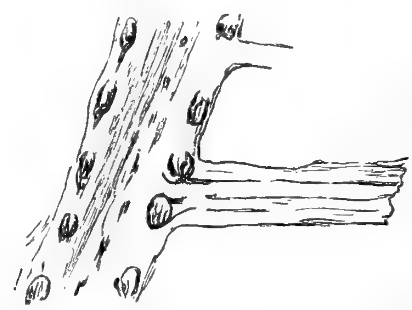


Fig. 172.—From Hairmyres, in Scotland.

The whole of the figures in this part of my communication are pen-and-ink sketches, but all are highly magnified.

Fig. 173.—Lateral Palæocoryne, from Richmond.

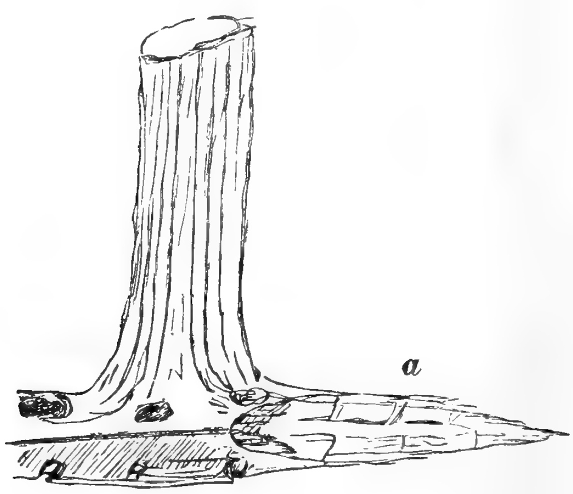


Fig. 174.—Bases of cells exposed through fracture.

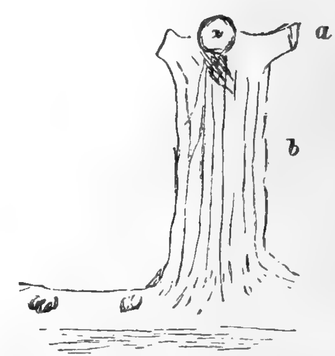


Fig. 175.—*Trophosome radiatum* (Duncan), Richmond. *a*, portion of tentacular capitulum; *b*, trophosome.

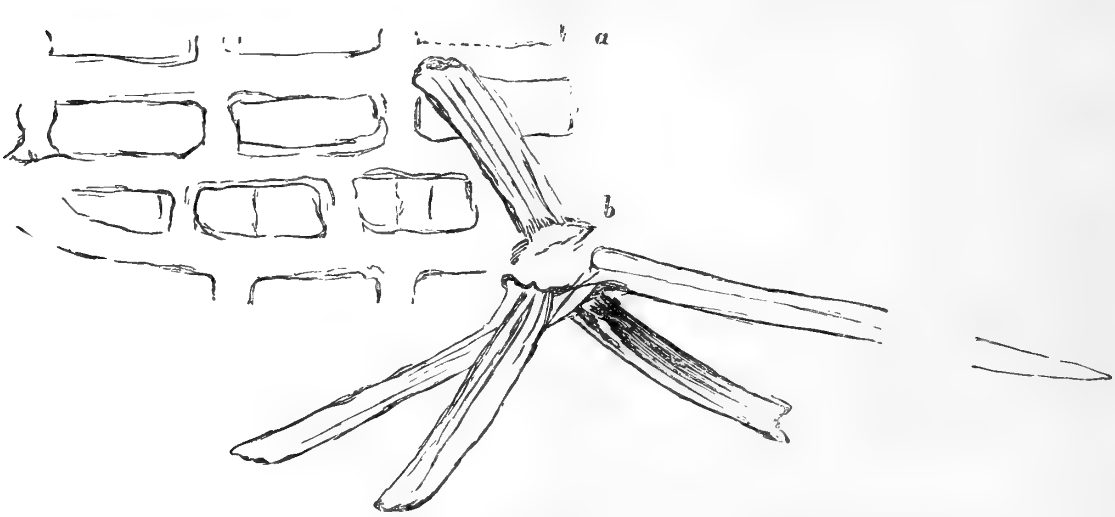


Fig. 176.—*Palæocoryne radiatum* (Duncan), very much crushed and broken; Halkyn, North Wales. (See text for description.)

dissepiment, buds at a slightly different angle, by this means causing a fork-like fenestrule instead of a rectangular one; and it is the bifurcations that help to increase the lateral expansion of the polyzoary.

the product of two cells. These "infertile" dissepiments are solid; there is no porosity in any of them to indicate that they were once hollow. Their existence was, from all appearance, for the purpose of reproduction, and so long as they remained unbroken, and attached to the branch, the zoœcium had the power of moulding the form of this branch-like projection into

* In the published address of the Professor in the "Transactions of the Linnean Society," I regret that I do not find the above admission; but I am assured that Dr. Allman gave it as reported in the "Zoologist" for July 1878.

many shapes. There is no difficulty in tracing all the forms of the hydrocaulus of *P. scotica* up to the varied shapes which these branchlets assume. In their natural state—that is, when attached to the side branches—these appear somewhat different to the figures given by Dr. Duncan in the "Philosophical Transactions;" but whenever they are broken away from the branches, a small portion of the poriferous face of the branch is broken off with them, and then, when found unattached in the shale, they present the same characters as the hydrocaulus and trophosome given by Duncan—except the hollow character shown in one of his figures. On looking at the figs. 171 to 174, all the branchlets seem to be thrown off without any expense to the colony. But this is a false idea. In the study of Fig. 205, SCIENCE-GOSSIP, Nov. 1878, it will be seen that there has been general disarrangement in several branches; and the formation of the fenestrules has suffered in consequence of the formation of these branchlets. This specimen has been slightly rubbed down* for the purpose of tracing the connection between the branch and the branchlets. At (*a*) the bases of the cells are somewhat exposed, and at (*b*) there is an immature fenestrule, and on the reverse side there are the remains of *P. scotica*, as figured in 205-6. It is not only on the zoœcium that the "non-sexual" reproduction devolves, but apparently, from what is shown here, upon the zoarium also. This is no solitary example of the production of Palæocoryne. I have many of a similar character; and I have found, generally, that wherever there is a disarrangement of the ordinary shape of the fenestrule, Palæocoryne in some of its forms is the disturbing agent. On the face there is a contraction, or sometimes a cohesion of branches, while on the reverse there are the bases apparently, but apices in reality, of *P. scotica*. In one of my specimens (Fig. 176) from the Halkyn carboniferous shales, the character of both *P. scotica* and *P. radiata* are preserved. To show this with more truthfulness, I have drawn a portion of the reverse of the Fenestella, and several of the fenestrules. At (*a*) a portion of the branch is withered, but this part of the trophosome is apparently *in situ*; at (*b*) also the base of the hydrocaulus is broken away from what Dr. Duncan calls the tentacular surface of *P. radiatum*. In Figure 203, SCIENCE-GOSSIP, 1878, we have an organism altogether different from anything that has been figured or described, and I have striven to give the general as well as the true character of the specimen. The apparent organism is seated astride a fragment of Fenestella. But this hitherto undescribed form is not Palæocoryne.

In Fig. 175, a specimen from Richmond in Yorkshire, I have given the hydrocaulus of *P. scotica*, similar in some respects to the figure of Dr. Duncan in the "Philosophical Transactions." I give these, not because they are rare, but as species that are very plentiful. Of these I have several score, and I have studied them in all the gradations from one form up to another, and although my cabinet is enriched by specimens from Yorkshire, Northumberland, Belstonburn, Gare, and Hairmyres, in fact, from nearly everywhere where Fenestella is found, still the whole present the same type—the character of the Belstonburn and Gare series coming nearest to the Yorkshire series, and those from Hairmyres comparing favourably with those from Northumberland.

(*To be continued.*)

* "Rubbed down," not "upside down" as in description.

THE ARCHED CROWN; MOTION OF CLOUDS; SPIRAL CURRENTS.

By the Rev. S. BARBER, F.M.S.

THE phenomenon of repulsion between cloud-masses of apparently different composition, to which we drew attention in SCIENCE-GOSSIP for January 1879, as instanced in the case of the "arched crown" over the summit of cumulus, suggests to us this inquiry: how does it happen that in an apparently homogeneous state of the surrounding air, the visible vapour or cloud can assume such varieties of form, and develope new physical properties?

In order to facilitate our conception of cloud phenomena, and to help us to understand the laws which affect them, it is well perhaps to regard the watery atmosphere as distinct from the composition of oxygen and nitrogen by which it is surrounded, and in which it passes through its protean metamorphoses. To consider a cloud as a thing isolated and distinct from the air which encloses and to a great extent permeates it, may not be altogether a philosophical method of regarding the subject; but undoubtedly it has a basis of truth, and is useful in respect to weather study. And inasmuch as various species of cloud possess peculiar thermal and electrical properties, it is not entirely unscientific.

We are therefore justified probably in regarding the principal forms of cloud as *organisms*, actuated by certain laws and exercising *peculiar forces;* playing in fact, an important *rôle* in the economy of Nature. Thus we may realise the conception of the poet, as embodying not only the ideal beauty, but also something of the physical truth of his subject, when he represents to us the cloud as a beneficent angel:

"I bring fresh showers for the thirsting flowers."

And again,

"I wield the flail of the lashing hail."

To give a satisfactory explanation of such electrical phenomena as the "capped cumulus" is, indeed, no easy task; but a better account might perhaps be given of them if aeronauts would provide themselves with instruments of sufficient delicacy: yet the appearance of the sky alters so much with distance that

the results, even then, would be far from satisfactory. The same may be said, with double force, of the extraordinary varieties of form presented by cirrus; lines crossing and curving in almost every conceivable direction. But what we aim at is this—to obtain such general laws as may agree with the analogy of the subject and be of some use, as prognostics, and also to depict and to classify those varieties which are decidedly significant of weather change.

It may be thought, indeed, that classification is very much a matter of *theory:* accurate delineation of separate phenomena has, however, a very *practical* bearing; and the readers of SCIENCE-GOSSIP will, perhaps, endorse the expression recently used by a writer in the "Examiner," who speaks of our present subject as "highly interesting, intimately connected with, and absolutely necessary to, the science of weather forecasts."

We now draw our readers' attention to the manner in which banks and masses of grey and highly condensed cumulus drift over the sky, chiefly in the spring and winter months, in breezy weather, especially when this is accompanied by heavy rain. This appearance may be contrasted with the phenomenon of the "calling of the sea," the noise caused by the swell of the waves reaching the shore before the wind comes up. In the latter case we have undulations *radiating from* a centre of disturbance; in the former we have vapour masses advancing to a centre of attraction.

Fracto-cumulus,* as Prof. Poëy has termed it, has often a resemblance to an undulating sea of vapour, in the manner in which the masses arrange themselves in banks above each other—an appearance which may be well observed on the coast of East Kent when a north-east wind is setting in. It is curious to notice how these vapour masses advance in regular line to some far distant point with a steady onward march, like vultures scenting their prey afar off.

Some writers seem to regard the clouds themselves as the origin of the aerial currents, and not mere attendants upon them. One fact, however, appears evident, viz., that masses of cumulus moving in this way, are generally accompanied by subordinate and complicated eddies and currents—rotary, spiral, &c., which whirl about them without altering the direct line of advance.

Thus two masses of cloud moving with but a slight interval between them will be attended by their own peculiar, and sometimes *opposite*, currents, while they are both moving on with the general drift, in a steady and regular line.

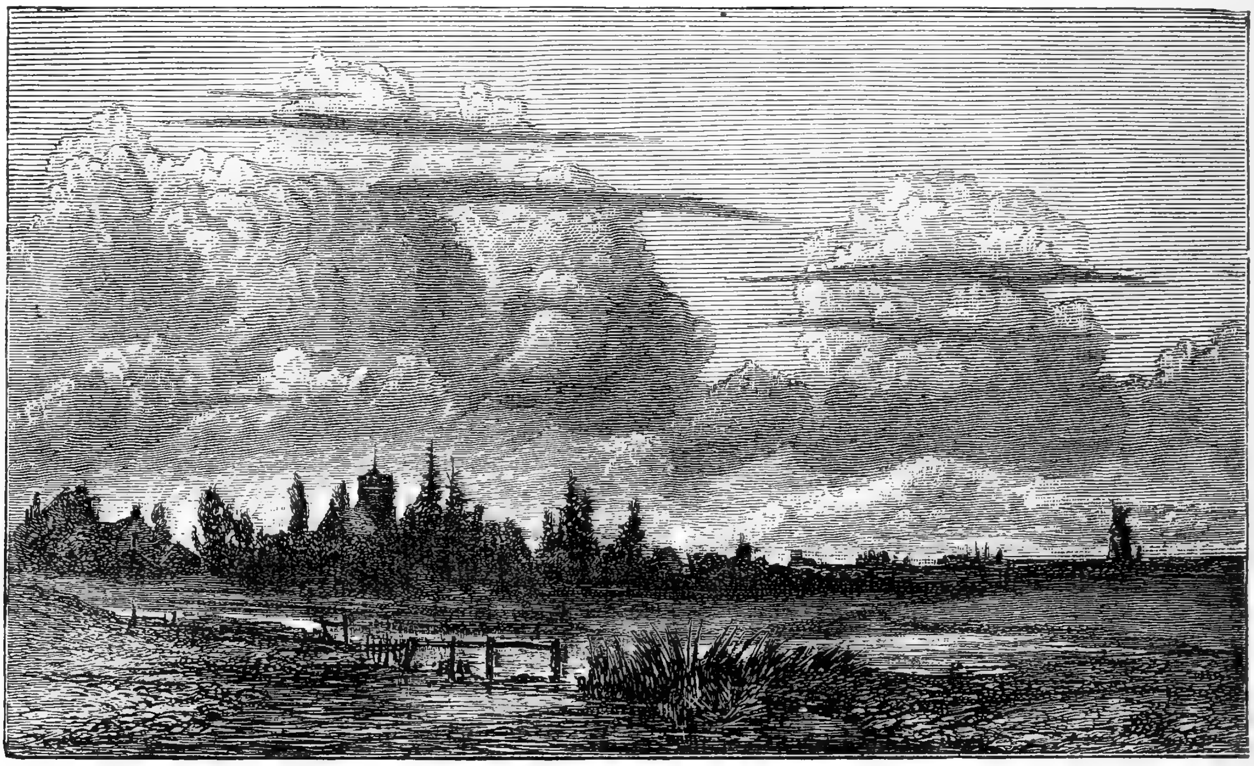


Fig. 177.—Electrical stratus, with capped cumulus in distance.

We will not at present enter upon the inquiry here suggested, as to the extent to which a sudden change in the molecular arrangement may originate movements of the surrounding air; we desire, now, to draw the readers' attention to the manner in which the eddies and spiral currents above mentioned may affect the *form of the mass.* To take one instance, such a spiral current, varying in its radius would be a very probable cause of the lateral compression or characteristic "anvil" form.*

In confirmation of this view, it may be remarked that previous to the gale which these clouds so often portend, we may sometimes observe small cyclones whirlwinds moving upon the surface of the earth, where this spiral motion is more evident from the

* In the case of this cloud, the arrangement in banks and strata is mainly the effect of perspective.

* There are several varieties, however, of this cloud, about which we hope to say more at a future time. See a paper of mine in "Popular Science Review," October 1873.

attendant particles of dust which are absorbed in, and which mark its outline and course. A remarkable instance occurred recently, May, 1879, in which such a whirlwind, formed almost instantaneously, ripped away the entire roof of a house, the surrounding air being quite still at the time.

I have watched from a distance of a few yards a small cyclone of this character, in which the dust, so absorbed, revolved with intense rapidity, while the atmosphere around was perfectly calm. This was on a hot summer day. The presence of such currents of air among the clouds may account for some of the more remarkable forms which these occasionally assume.

MICROSCOPY.

EUGLENA VIRIDIS AND ITS BULBED FLAGELLUM.—In Mr. F. Jas. George's communication of August 1st, number one sketch certainly resembles a Euglena of some sort, but does not show flagellum with bulbous termination. The second and third sketches represent a widely different organism. Unless the transitional stages are watched unremittingly, the mere fact of one organism succeeding

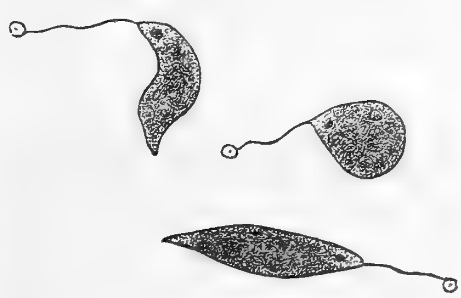


Fig. 178.—*Euglena viridis*, showing the bulbed flagellum.

or taking the place of another cannot be accepted as a veritable metamorphosis, and *Euglena viridis* still remains on the border line between the animal and vegetable kingdom. I enclose sketch by Mr. G. Harkus, showing three of the protean forms commonly assumed by *E. viridis*, and swelling or bulb with which the flagellum ends (Ross $\frac{1}{4}$-in. B eyepiece + 380). These may be of interest, as I at all events have not met an observer who has previously noted this peculiarity. —*M. H. Robson*, *Newcastle-upon-Tyne.*

MANDIBLES OF ANTS WORN BY USE.—An assertion having been made at the Boston Natural History Society by the Rev. H. C. McCook that the mandibles of ants become blunted, and are even worn off by use, a microscopical examination of about one hundred specimens of Pasimachus has taken place before the society, when it was seen that all the fresh specimens had perfectly shaped and sharp mandibles, whilst those specimens which were old and worn-looking presented every gradation of bluntness of the mandibles.

THE QUEKETT MICROSCOPICAL CLUB.—No. 40 of the Journal of this well-known Microscopical Society contains the following papers:—"On the Urticating threads of *Actinia parasitica*," by F. A. Bedwell; "On the Rotifers, by dark field illumination," by C. T. Hudson; "On the Micro-Megascope," by Dr. John Matthews; and on "The Dual-Lichen Hypothesis," Dr. M. C. Cooke. The last paper is a thorough and unanswerable demolition of the theory of Schwendener that lichens are only so many algo-fungi. Nobody was so capable of dealing with this subject as Dr. Cooke, and nobody could have done it so well.

NEW SPECIES OF ENTOMOSTRACA.—At the recent meeting of the British Association, Sir John Lubbock called attention to the occurrence in England of *Leptodora hyalina*, a very interesting crustacean found in the deep Swiss lakes, subsequently in those of Switzerland, Russia, and Italy, and recently found by Messrs. T. Bolton and H. E. Forrest in the Olton reservoir, near Birmingham, though not in any streams or shallow waters. Like many marine organisms it is as transparent as glass—a peculiarity which is of advantage to vegetable feeders, as rendering them less conspicuous to their foes, and to predaceous species by enabling them to steal unsuspected on their victims. The anterior antennæ are peculiarly developed in the males, but quite small in the female. It has been a question whether these organs are for hearing or smelling. The latter seems most probable; where one sex attracts the other by sound, both sexes have the ear well developed. Of course the sex attracted must have a good ear in order to distinguish the sound; but so also must the singing sex, in order to regulate the sound. Hence in such cases we do not find any marked difference between the auditory organ in the male and female. But with smell the case is different. The scent is a specific characteristic, and is not regulated or modified by the will of the individual. Hence, when one sex attracts the other, it is not necessary that the attractive sex should have well-developed organs of smell. Hence Weismann concludes that in leptodora the anterior antennæ, being much more highly developed in the male than in the female, are organs of smell. After describing some other curious points in its anatomy, Sir John observed that like other animals of the same group, leptodora lay two kinds of eggs—one sort in summer, which hatch rapidly, and a second in autumn which are provided with a thick coat and remain undeveloped through the winter, hatching only when the warm weather returns. It is a most curious and interesting fact that, as Müller observed, these two eggs produce young which are quite unlike one another. In our common Daphnia the young at first are quite unlike their parents, having only three pairs of appendages, and being in what is called the "nauplius" stage. Such young

crustacea were at first supposed to be distinct animals and were called nauplius, but subsequent observations have shown that many, he might say most, crustacea, however dissimilar they may be when mature, for instance, the lobster, cyclops, &c., commence life as a small oval being with three pairs of appendages, whence some naturalists following Fritz Müller, are of opinion that all our crustacea are descended from an animal of this form. But leptodora during the summer, even in its earliest days, is said to resemble the mature form, differing only in size and some details. It is therefore very interesting that the young when developing from winter eggs should commence life in the nauplius form. Curiously enough, the same reservoir has yielded to Messrs. Bolton and Forrest a new species of Entomostraca which has been provisionally named *Daphnia Bairdii* and which is described by Mr. Forrest in the last number of "The Midland Naturalist." Mr. Bolton has sent out both these interesting animals, in the living state to his subscribers; and he also exhibited them together with many other living microscopical animals with great success at the conversazione in the Cutlers' Hall, Sheffield, during the Association meeting. We are glad to draw fresh attention to Mr. Bolton's scheme, and to express our high satisfaction with the illustrated descriptive portfolio of all the objects he has hitherto sent out, and which can be obtained for one shilling from David Bogue, 3, St. Martin's Place, W.C.

ZOOLOGY.

A TWO-TAILED LIZARD.—A few days since I was shown by Master Attwood of this town, a specimen of viviparous lizard (*Zootoca vivipara*) with a double tail. The duplication commences at about the lower third, the natural tail is about the same size and tapers as usual, and has the proper directions; but the sprout, if one may so term it, stands out at an acute angle, and is about the same size as the normal tail. There is no mark of injury to account for this abnormality, of which I have never seen a similar example.—*Henry Laver, F.L.S., Colchester.*

CORONELLA LÆVIS IN HAMPSHIRE.—I am unable to answer Mr. Tuxford's query (page 164), as to the occurrence of *Coronella lævis* in the New Forest paper; but it may be worth recording that a specimen was killed on the cliffs, west of Bournemouth, in the summer of 1877, by one of my sons. It was supposed at first sight to be an adder, and was hastily struck at and killed.—*W. H. Groser.*

THE BRITISH ASSOCIATION has been invited to visit Leicester in 1882, a town in which it has never yet held its meetings, and there is reason to believe the invitation will be accepted.

URTICATING HAIRS OF CATERPILLARS.—At a recent meeting of the Entomological Society of London, Mr. Swinton maintained that the urticating property of the hairs of the well-known caterpillars of the *Liparis auriflua* was not merely mechanical in its origin, as has hitherto been supposed, but that the hairs were poisoned by a caustic liquid issuing from the scarlet tubercles on the hinder segments.

NEW SPECIES OF BRITISH SPIDERS.—The Rev. O. P. Cambridge in an article on this subject which appeared in the last number of the "Annals and Magazine of Natural History," says that he has been enabled to add thirty-nine species to the list of spiders known in great Britain and Ireland, since February, 1878. One of the spiders described forms a new genus (Theridiosoma), and Mr. Cambridge states that it forms a link between Theridion and Epeira. The number of known species of British spiders is 519.

WATFORD NATURAL HISTORY SOCIETY.—Part 5 of the Transactions of this vigorous society has just appeared (published by David Bogue, 3 St. Martin's Place), containing the anniversary address of the president (Dr. A. T. Brett), a capital paper on "The Study of Geology," by J. L. Lobley, F.G.S., one on "Bees and Bee-keeping," by the Rev. H. R. Peel, M.A., &c.

PARASITES ON HEDGEHOGS.—In reply to Mr. Singer Barclay's query, p. 205 of present volume, as to hedgehogs having parasites, it may be noted that the common tick, *Ixodes erinaceus*, found on dogs, derives its specific name from being found also on hedgehogs.—*X.*

RARE CETACEANS.—I am very pleased to find that by means of my papers on whales, Mr. Anderson was enabled to identify the whale killed off Moville with the giant Sibbald's rorqual. Nobody but a student of this interesting order knows how disappointing it is to see announced in the papers that a whale or whales have been seen or captured on such a part of the coast, not the slightest clue being given as to the species—this has been the case more than once in the past few months—when a very slight acquaintance with the subject would enable the observer in most instances to recognise the species, or at least to note the specific peculiarities which would enable others to do so. My object in writing the papers referred to was to supply in as popular a way as possible such information as would be useful for that purpose. I wish I could reprint it and send a copy to every coastguard station and sailors' home in the kingdom. I have no doubt it would be the means of placing on record the occurrence of of many a rare individual which now passes unrecognised. At this season of the year many of the smaller cetaceans, dolphins, &c., follow the shoals of herrings along the coast, and occasionally one gets entangled in the nets of the fishermen, who are too

busy to give it much attention, and pass it by as a porpoise or a "queer fish," good to make into oil, and nothing more is heard of what may in reality be a most interesting occurrence. Such an event occurred the other day at Yarmouth, where I chanced to see in the possession of some long-shore men a very handsome specimen of the white-scaled dolphin (SCIENCE-GOSSIP, xiv. page 87). Nobody had the slightest idea of the species, nor of what variety they were looking at; of course it was a large porpoise. I hope your readers along the coast will keep a good look-out for cetaceans, and satisfy themselves as to the species of every individual which comes under their notice. I shall at all times be most happy to assist them if it be in my power.—*Thomas Southwell, Norwich.*

INSECT SWARMS.—This summer will be entomologically memorable for the vast swarms of the painted lady butterfly (*Vanessa cardui*), which have appeared over so large a part of Europe, including Great Britain. Swarms of the gamma moth (*P. gamma*) have also been seen along various parts of the coast, including Devonshire and Norfolk. They were very abundant at Cromer during the earlier part of September.

BOTANY.

For further particulars on botanical works see "Natural History Book Circular," No. 39, on botany only, 44 pages, post-free on receipt of one stamp, by William Wesley, 28 Essex Street, Strand, London.

An alphabetical list (which I unfortunately do not possess) of 15,000 works on botany, from the earliest to present time, is G. A. Pritzel's "Thesaurus Literaturæ Botanicæ omnium gentium," &c., new edition, 577 pages 4to., Leipzig, 1877, £2 5*s*.

Lest any one should be deterred by their costliness from purchasing some of the above works, I may say that *some* of them, especially the older ones, may be had at very greatly reduced prices.—*B. Hobson, Tapton Elms, Sheffield.*

VEGETABLE "COMMENSALISM."—I have frequently noticed the association of commensalism between butterbur, *Petasites vulgaris*, and one of the most delicious of our edible fungi, I mean *Peziza venosa*, locally known here as the "Jew's ear." It grows at the time when the butterbur is in flower, and as a rule, where you find the peziza, you find the flowers of petasites accompanying it. I have found this so often the case, that now, in examining any fresh locality for "Jew's ears," I generally content myself with looking for butterbur first, one is so much easier seen than the other. The above, like all rules, has its exceptions; still there is no doubt that there is something more than chance in the association of the two plants. It may be only that the same kind of light sandy soil suits them both, or it may be something more.—*W. D., Carlisle.*

VEGETABLE "COMMENSALISM."—Like Dr. Taylor, I have noticed the *C. perfoliata* and *O. apifera* growing together, in a field at Ewias Harold, Herefordshire, and lately in a field at the foot of the Cotswold Hills, Gloucestershire. On the Cotswolds I found several plants not frequently met with: *Anthyllis Vulneraria*, *Centaurea Scabiosa*, *Orchis pyramidalis*, *Campanula Rapunculus*, *Echium vulgare*, *Scabiosa columbaria*, *Carduus nutans*; also albino specimens of *Campanula rotundifolia*. It may interest you to know that I have found albino specimens of *Pedicularis sylvaticus* and *Geranium Robertianum.*—*T. G. Harris, Cheltenham.*

CATOSCOPIUM NIGRITUM.—Wilson, in his "Bryologica," gives this moss as fruiting in the month of March, while Mr. Hobkirk mentions specimens collected at Fife, fruiting in August. It may interest your readers to know that I found this plant on August 6 in good fructification, on the sand hills at Formby, thus confirming Mr. Hobkirk's statement. I shall be happy to supply any readers with a specimen.—*Benjamin B. Scott*, 24 *Seldon Street, Kensington, Liverpool.*

DIPSACUS SYLVESTRIS.—This plant grows plentifully on some parts of the Crumbles, Eastbourne, and during the present season it has illustrated in a striking manner the use of the connate bases of its leaves. The excessive rains of the month of June filled the whole of the connate cups with water, and, notwithstanding the boisterous winds, the stems were sufficiently rigid to resist their action to such an extent as to preserve a good supply of the fluid, especially in the lowest pairs of leaves. On examining them, it appeared that every cup had caused the death of a goodly number of the enemies of the plant, such as ants, caterpillars, earwigs, and such like small deer. There were at least ten or a dozen creatures drowned in the lowest cup of each plant. A few were to be found in some of the higher cups, and in such cases nearly all of the leaves forming the receptacles had contact with adjacent plants. The inference seemed perfectly sound that the leaves were so modified as to collect the rainwater in which small creatures would be drowned, whose visits would be detrimental to the reproductive organs of the plant.—*J. Saunders.*

REGISTER OF FIELD BOTANISTS.—I gladly hail Mr. Melvin's proposition. I have myself, when wandering in a solitary fashion over Westmoreland and North Wales, felt the want sorely. Although it is seldom a month passes away but that I am called away from home, to go with other naturalists over my part of the country; somehow, they find me out.—*R.*

Hypericum Calycinum (*St. John's wort*).—This plant, though said in Sir James Edward Smith's "English Botany" to be frequently seen ornamenting shady gardens and shrubberies, I do not remember having observed in gardens, since the days of my boyhood, in a damp sunless corner of a rectory in Essex, upwards of sixty years ago, except at Folkestone, where I saw it growing at the edge of a very small clean running streamlet in the garden of the Pavilion Hotel. Being desirous of obtaining the plant for cultivation in a most shady spot, I applied to Mr. Balchin at his nursery, Cliftonville, when I found he had recently introduced it; it was then (September 1) in full flower. It is admirably adapted for damp spots shut out from the sun's rays, where nothing else will grow, and would be a great ornament under the trees in the Pavilion Gardens at Brighton, and especially in a place called the Level, where has lately been planted ivy, as also the evonymus, which latter shrub, though it will live, will never thrive under the trees as in the open air; it is a very low evergreen shrub, with very large bright gold coloured flowers. It is noticed in Sir S. E. Smith's "English Botany" as follows: "Few plants flourish so well under drip of trees, but its creeping habit renders it better adapted to the shrubbery than the garden." Flowers from June to October. It needs no other recommendation to those who wish for pretty and cheerful flowers interspersed in shrubberies and among evergreens. The "Treasury of Botany" says this is commonly planted in shrubberies or extensive rookeries, where it is valued not only on account of its handsome flowers, but because it affords excellent shelter for game.—*T. B. W., Brighton.*

Spartina stricta.—It may interest lovers of the gramineæ to know that this grass, which was thought to have disappeared from this neighbourhood, has been again found; but although now early in September, it has scarcely begun to flower.—*F. H. Arnold, Fishbourne.*

GEOLOGY.

The Metamorphic Rocks of Scotland.—Mr. James Thomson, F.G.S., at a recent meeting of the Glasgow Geological Society, exhibited a series of metamorphic rocks from Harris and Loch Maddy, North Uist, and read notes on their stratigraphical aspect, and briefly referred to the opinions of Dr. McCulloch, Sir Roderick Murchison and others who had described the rocks of these islands as belonging to the "Fundamental Gneiss," the oldest series of rocks in Scotland. By some observers these crystalline metamorphic rocks have been regarded as the oldest in the world. Mr. Thomson then described the series in the neighbourhood of Harris in their geological sequence, and referred to some varieties of "granite," "granitoid" "gneiss," and to an extensive body of conglomerate he had discovered interstratified with the granite and granitoid gneiss, which consists of fragments and boulders of gneiss, hornblendic gneiss, and granitoid rocks, varying in size from small particles not larger than a small pea, to boulders eight feet in diameter, all more or less different from the rocks that immediately surround the section, and which are embedded in a more or less felspathic matrix, in some places of a dull bluish-gray colour in others of a creamy colour. He then described the rocks in the neighbourhood of Loch Maddy, North Uist, beginning with those exposed on the shore line near the pier, all of which dip to the north-west. About two hundred yards from the pier he found interstratified with the gneissic rocks of the district a bed of conglomerate two hundred and forty feet thick, extending from the shore inland for fully one mile, it may extend further inland, but the section was lost in the banks of one of the fresh-water lochs which occur so frequently in the North Uist, but his time would not permit him to trace further the conglomerate mass. There is an excellent section exposed opposite the inn door. The matrix is felspathic, and is of a dull bluish-gray colour, but in some parts it passes into a somewhat greenish colour. The embedded erratics consist of gneiss, hornblendic gneiss, granitoid gneiss, with some numerous particles of vitreous quartz, varying in size from minute fragments to boulders of considerable dimensions. They did not resemble pebbles and boulders which had been exposed to the action of water upon a coast-line; some were angular, subangular, or rounded, and had all the appearance of having been transported and dropped into a soft plastic matter. Indeed the section is more like some of the sections of boulder drift of more recent times. It had been suggested that the conglomerate might belong to that series described by Dr. Hicks as Pebidian and Dimetian, but a careful examination of the rocks these erratics are interstratified with, led the author to believe that neither the Pebidian nor Dimetian beds are found in the locality. He had seen what he believed to be the Pebidian beds in Loch Carron, and also in Skye, to the south of the Bay of Lucey, near Broadford, where the Cambrian conglomerate is seen reposing upon the Pebidian beds, and which in turn repose upon the Dimetian series. The latter extend to, and are well exposed in the Isle of Ornsay, in the Sound of Sleet, but he had failed to discover rocks of either of the latter series in Harris or Loch Maddy, North Uist. Mr. Thomson referred to the able paper of Mr. James Geikie, F.R.S., and was surprised that no mention was made therein of this section of conglomerate, and more especially as there is one of the best exposed sections opposite the hotel door at Loch Maddy. He then stated that he inferred from the presence of these erratics embedded in the felspathic matrix and interstratified with a series of metamorphic rocks,

which have been regarded as the fundamental gneisses, that we have yet much to learn before any satisfactory solution can be given regarding the true position of the rocks of that district. The presence of these conglomerates interstratified with the so-called fundamental gneisses, is a clear proof that there must have been a pre-existing land from which these erratics have been derived, and another proof that we are not yet in a position to draw the hard-and-fast line between one period and another, nor can we dogmatise as to which are the oldest rocks, or even say which is the oldest form in the life-history of the globe. Mr. Thomson then referred to the striking similarity which existed between some varieties of the graphic granite that had been discovered in the above locality and some varieties considered to be of organic origin. It seems highly improbable that such an extensive series of metamorphic rocks should be destitute of the remains of organic life. There is abundant evidence that during the period they were being desposited there were great sheets of both marine and fresh water. Mr. Thomson said that he merely meant to record the discovery of conglomerate, and reserved the describing of it in a more detailed manner till some future occasion.

COLLECTORS of prehistoric antiquities are warned against fabricated specimens of articles purporting to belong to the age of bronze, and to have been among the remains of lake-dwellings, and in the beds of rivers. There is a regular manufactory of these things near the lake of Bienne, and bronze swords are being offered at a hundred francs each which are not worth as many centimes.

THE MUSK-OX IN ENGLAND.—In a recent number of the "Geological Magazine," Mr. W. Davies, F.G.S., announces the discovery of the teeth of the musk-ox (*Ovibus moschatus*) in the brick-earth, at Crayford in Kent. The specimens belonged to an individual of large size. The distribution of the existing musk-ox is now limited to the barren land of Polar America, between the 60th and 83rd parallels of latitude.

MICRO-PALÆONTOLOGY.—We have received the catalogue of species, sections, and material, supplied by Messrs. G. R. Vine & Son, of Attercliffe, Sheffield. The gradually increasing desire on the part of students to know more of the micro-palæontology of our rocks has induced these gentlemen to master all the details of this intricate study. Mr. Vine, jun., has devoted his attention to the foraminifera and entomostraca, and Mr. Vine, sen., has devoted much time and labour to the polyzoa and other organisms. We were much pleased to notice the importance attached by the general committee of the British Association to Mr. G. R. Vine's labours, by their making him a grant of £10 to enable him to continue them.

GLACIERS IN SAXONY.—Prof. Credner has just discovered polishings and groovings on the surface of porphyritic rocks in Western Saxony, and concludes from these and other facts that the Scandinavian ice reached as far as the neighbourhood of Leipzig, and to the southern border of the North German plain.

"CHEMICAL DENUDATION IN RELATION TO GEOLOGICAL TIME."—Under this heading Mr. T. M. Reade, F.G.S., has published three thoughtful and suggestive papers. One of them, "Geological Time," was his presidential address to the Geological Society of Liverpool; another a paper read before the Royal Society, on "Limestone, as an Index of Geological Time" (which we thought so highly of as to reprint a lengthy abstract thereof in our columns) ; and a third on "The Geological significance of the *Challenger* discoveries." We are glad that Mr. Reade has been prevailed upon to issue these most interesting essays in their present attractive shape. They are published by David Bogue, 3 St. Martin's Place, London.

THE UNITED STATES GEOLOGICAL SURVEY.—We have received from Dr. Hayden all the publications of this survey from its commencement. What a vast mass of labour and research is here represented! In one of the "Bulletins," Mr. W. H. Holmes describes a remarkable geological phenomenon which occurs on the slopes of Amethyst Mountain, in the now well-known "Yellowstone Park." On the mountainside, which rises to between 2000 to 3000 feet above the river valley, there are exposed at different levels, a series of silicified trees, many rooted in position as they grew, and from twenty to thirty feet in height, while others, broken and worn, are lying at length. Some of the latter are of great size, the fragments measuring as much as eighty-two feet in diameter. The series of sandstone and conglomerates in which the trees are imbedded is more than 5000 feet thick, forming a vertical mile of fossil forests. The woody structure is for the best part well preserved, but where cavities have been formed in the trunks by the rotting of the wood, they are lined with crystals of amethyst, smoky and other varieties of quartz.

THE MIOCENE FLORA OF THE NORTH OF IRELAND.—At the recent meeting of the British Association, Mr. W. H. Baily, F.G.S., Palæontologist to the Irish Geological Survey, reported on this subject. He stated that the fossil plants occur in a deposit of brown and red matter lying between two sheets of basalt. Twenty-five species of plants have been determined. They are most closely allied to the fossil flora of North Greenland, although some of the species occur in the Bovey Tracey deposit, in Devonshire.

NOTES AND QUERIES.

INTELLIGENCE IN MAN AND ANIMALS.—Is it memory that causes a newly hatched chick to distinguish between a pebble and a grain of rice, or a full-grown bird to distinguish between a poisonous berry and a non-poisonous one? If in these cases a negative reply can be given, and I think it must, and we are to consider animals as being actuated by the same motive powers as man, this certainly goes to prove that reason does exist without memory, inasmuch as reasonable things are done where memory cannot come into play. I speak here of memory as we ordinarily understand the term. Evolutionists would probably say that in the two cases I have mentioned memory, or the effects of memory, are not altogether absent, but by the law of heredity the acts are the results of the memory in ancestors. If we grant this, we have to admit a kind of memory different from that in man. We have, on the one hand, man having the power of acting and thinking freely from his own individual memory, and, on the other, animals impelled by inherited results of memory of their ancestors. Now can it be otherwise, if both animals and man denote intelligence from such different fundamental sources, than that the intelligence of the one must be fundamentally and essentially different from that of the other? It is contended that besides the power of instinct, we are to give animals credit for a degree of reason of the same kind as that displayed by man; but it is difficult to see how it can be possible if a man were born with the instincts of a cat, a dog, or of any other animal, that he could be the same kind of intellectual being he is (or, indeed, an intellectual being at all) that is capable of the same kind of reason. If we can see this would be impossible with man, I think we may fairly conclude that it is not possible with animals. Reason is the result of the exercise of the power of arranging facts, drawing deductions from them, and acting from those deductions uninfluenced by the impelling force of instinct. This kind of reason, I take it, is only possible in man, as he is, so far as we know, the only being who is so uninfluenced. From being so, he is able to act from his own understanding, which, I contend, he would be unable to do were he controlled by any inherent natural motives called instincts, and that instincts, if he had them, would entirely subvert his understanding. From this point of view it would seem that instinct and reason are not only alike, but the one is opposed to and inconsistent with the other, so that where we admit instinct, we preclude reason. It may afford a good illustration of this to consider how man acts when he has acquired strong habits, which become very much like instinct. We see in cases of drunkards, and others addicted to injurious habits, the power to act reasonably with regard to those habits almost, and in some cases entirely, gone. Although it may be known to those addicted that even death may be the early result of persisting in the habits, that knowledge is not sufficient to cause them to exercise reason. We may suppose that instinct being a part of the very nature of animals, and not being subject to the checking influence of the understanding, has a very much stronger force than habit, and therefore, if the above instance is true as to the force of habit acquired by man, and in opposition to his knowledge (and the case is stronger if we bear in mind that sometimes very intellectual persons become hopelessly addicted to injurious habits, after living, it may be, twenty or thirty years an intelligent life), we may easily imagine how instincts of greater force inherent in the constitution, and capable of being exercised from birth, would preclude the possibility of man acquiring reason, as we understand the term.—*Robert S. Gilliard.*

INTELLIGENCE IN MAN AND ANIMALS.—In my letter of June I showed that Mr. Darwin's arguments respecting the origin of man are based on reasoning by analogy. Now, if the intelligence of animals differs from that of man only in degree, I am at a loss to see why this method of reasoning is necessary, because in that case, whatever is true of man must be true, in a minor degree, of animals; but many passages in Mr. Darwin's works prove that he feels he would not be justified in thus reasoning. That reasoning by analogy is not a safe method, I can illustrate by the mode in which it has misled me. Some time ago I lost a diamond from a ring, and, after some search, found it, and strange to say, close to it an object which I supposed was another diamond, as it closely resembled it in appearance. Reasoning by analogy, I exclaimed, "Since these objects closely resemble each other, they must have had a common origin." Picture my chagrin when a goldsmith informed me that the one I had lost was a diamond of the purest water from the mines of Golconda, and my newly found treasure a piece of glass from Birmingham. The Darwinian hypothesis is not only unsupported by facts, but it is in flagrant contradiction to them. There are some 20,000 species of animals, and not one instance is known of different species being crossed without sterility ensuing in the animal thus begot. It seems a law of nature to keep species apart. Darwin, to support his hypothesis has to assume that there may have been a time when this law was reversed. What would be thought of an astronomer, if he were to argue that though the attraction of gravitation is true now, there may have been a time when an apple thrown into the air would travel for ever in space? Darwin's argument is precisely similar, though its fallacy is not so obvious at first sight. If the theory of evolution be true, a multitude of animals should be discovered in various stages of physical change, which would defy the efforts of naturalists to classify. As is well known, the reverse of this is true. A skilled naturalist finds no difficulty in placing each newly discovered animal in its proper order. Mr. James George asks in the August number, How far is an instinctive act automatic, and how far is it the outcome of volition? The question, if it could be answered, would close this discussion, but I am convinced that it cannot be answered for the following reasons. We perceive that animals have some faculties in common with man, we see too that they have some primal impulses that man does not possess. On the other hand, we see that man has certain faculties, powers of abstract thought, imagination, introspection, and a moral sense unpossessed as far as can be judged by brutes. Some writers consider the moral sense an independent principle, but I am inclined to believe that, if not the result of the above named faculties, it cannot possibly exist without them. The consequence of these differences of nature is this, that in attempting to make a perfect analysis of the brute mind we are confronted with an insoluble metaphysical problem. Let the reader compare what is said on the subject by Darwin, Haeckel, Dr. Carpenter, Henslow, Mr. S. Butler, the letters in "Nature" and in this journal, and I think he will conclude with me that the diversities of opinion expressed are the consequence of the writers overlooking the enforced limitation of thought involved in the subject. For example, in the July number, Mr. James Hooper says: "The

spider weaves its net by instinct. But what if we tear a spider's web, and see the spider examining the mischief that is done, and either giving up its work in despair, or endeavouring to mend it as well as may be? Surely, here we have the instinct of weaving controlled by observation, by comparison, by reflection, judgment." In short, by reason. Now Mr. Hooper here supposes that the web is spun by instinct, but that, when broken, a different set of faculties comes into play. Surely, the primal impulse that causes the spider to spin its web can also repair it. Or, if reason is called into play for the repair of the web, why not for spinning it in the first instance? If so, why talk of instinct? Thus there is always a danger, as I pointed out in my letter of January, of man attributing to animals his own modes and laws of thought. Mr. Samuel Butler, whose works Mr. Hooper quotes, has been recently giving the world a new revelation in the "Examiner," which proves to be a species of polytheism. He thinks that all living beings form part of one great animal, which he calls God, and that the inorganic world was created by another God, and reasoning, by analogy, he thinks that the planets are, to use his own expression, similarly begodded. His argument, he adds, is a corollary of his previous writings. It should be remarked that the truth of his revelation (other considerations apart), depends entirely on the acceptance of the theory of evolution. Such is the result of the wild speculations of this very able writer. I quite agree with "Idea" that a reminder of what some intellectual minds (even if not scientific) have thought on the subject is of the greatest interest. No one disputes the facts laboriously collected by our great naturalists, but the inferences they draw from the facts are open to dispute, and can be discussed by those who are obliged for lack of opportunity to obtain their information from books rather than from direct observation.—*H. D. Barclay.*

Intelligence in Animals.—It appears to me that, in the interesting discussion which has been going on for several months in Science-Gossip, sufficient prominence has not been given to habit in animals. We all agree in the fact of instinct; but as to the power or faculty which seems to go beyond instinct, and override it—in olden times it was called sagacity, by way of distinction—there is a considerable diversity of opinion. Doubtless there is in animals something akin to reason, using the term in a vague and general sense, something that looks very much like a process of reasoning, in the facts observed and recorded of them; but after all, is there really anything more than can be fairly explained by the principle of association, by observation, and especially by habit? Does not what may be called the routine of habit, sufficiently account for many of these facts? and do not the mistakes of habit continually occurring lead to the suspicion at least, that there is no act of reasoning properly so called? My dog looks for a run about the time I take the letters to our village post office, and waits quietly outside the door of my dressing room, where I generally am before going; but he does this whether I go to the post or not, it is a habit of his; but he often blunders about the time, and the road I take, when it sometimes varies from the usual one. The baker's horse knows from habit at what houses to stop; but he would, if left to himself, stop at the same houses on going the same road on a day when not carrying bread. We know that horses wish to turn at a given road leading to their home, though their driver wishes to go straight on. It seems to me that these and many similar mistakes of habit, go far to disprove careful thought and processes of strict, intellectual reasoning in the brute creation. Without entering into nice points of intellectuality or metaphysical operation, I am convinced that the apparently-reasoning actions of animals may easily be accounted for as before stated. Association of ideas from association with man; daily habits, and impulse often arising from these, are surely sufficient to account for the remarkable facts of which we read, and which we personally witness in relation to animals, without seeking to ally them with the intellectual and spiritual parts of man's wonderfully composite nature. In reading the remarks on this subject in Science-Gossip, I have been reminded of the words of the wise man (Eccles. iii. 21) "Who knoweth the spirit of man that goeth upward, and the spirit of the beast that goeth downward to the earth?"—*J. S. B., Pentney, Norfolk.*

Intelligence in Man and Animals.—From the many instances recorded in your journal and elsewhere, and the numerous others which must occur to the mind of every observer of the habits of animals, I cannot imagine how it is possible to deny to other animals than ourselves the power which we call reason. Define the word as we will, let the cloud of words be ever so delightfully obscure, I do not think the impression which presents itself to one's mind when the word reason is used, will be at all the clearer. I will therefore leave the attempt to those who have more leisure than myself. I wish to give you an instance of what I cannot but regard as reason in an animal. Some two or three years ago I had a very powerful tom-cat called "Muff," a great favourite with everybody, which favour he returned with evident signs of affection. But, alas! Muff was a great poacher, and has more than once come home in a sad plight. On one occasion I was called by my little girl to come and look at Muff, who was lying on the hearth-rug in the breakfast-room evidently suffering intensely. On passing my hand over his side, I found a bunch of wire just level with his fur, and of course saw at once that he was snared; he had bitten the twisted strands of copper wire through close to his body, and thus made his escape, but the snare was still round his loins so tightly drawn as to be deeply imbedded in his flesh, and only to be got at where the wire had passed over his backbone. At this point a pair of cutting-pliars soon relieved him from the painful ligature. Now although I touched the cat as tenderly as possible, the examination must have been extremely painful, but in spite of language which was dreadful to hear, not the slightest attempt to retaliate was made by puss, but rather, by the way in which he resigned himself to my hands, and by the disposal of his limbs, he seemed to, and I have no doubt did, render me every assistance in his power. Let the reader call to mind what occurred the last time he had a tooth extracted, how he screwed up his (what he called) moral courage, and went through the operation. Can I doubt that Muff showed moral courage, and that he reasoned thus? "I am in great pain, my master has never showed me anything but kindness, he can relieve me, and I am sure he will do so. I will therefore submit myself to his hands." If ever cat looked grateful, the expression on poor Muff's intelligent features was that of intense gratitude for the reward of his faith.—*T. Southwell, Norwich.*

Intelligence in Animals.—In answer to Mr. Barclay, I briefly state my opinion on this point. If we meet a friend, something enables us to recognise him, some power of distinction (i.e. reasoning in some form, though very simple, perhaps) is called into play. It may not take the form of a distinct

proposition, but I think it exists, although perhaps almost unconsciously. Similarly with animals. Again, occasionally we cannot at once call to mind some fact we wish to use; but a related fact may occur to us, and suggest the one we originally wanted. There is, I think, some reasoning in this act of memory. I admit that in all cases memory may not involve reasoning, but in many it does, although sometimes very slightly and all but unconsciously. I do not think memory is instinctive, though it may sometimes become nearly so. The converse proposition, that reasoning cannot take place without memory, is, I think, true. With respect to Mr. Kitton's suggestion, that the pipes were in the way of the rats, it is certainly a simple explanation. It may be so at times, but it does not follow that the rat could not open a pipe with the intention of obtaining water. The water may sometimes be heard trickling, if not in Mr. Kitton's case, and rats might have more than one motive for cutting the pipes. But in the supposition that the pipes were in the way, the animals might reason about cutting them. If anything were in our way, we should think that, to pass on, we must remove it. Might not the animals do the same? I do not think that it is impossible. In a recent number of "Nature," I see that some reasons are given for thinking that in some instances the memory of localities may be hereditary. If so, this does not make the subject of memory easier to explain. Whether this may favour or oppose my line of thought, it ought to be mentioned, as leading, perhaps, one step nearer to what we are in search of, that is, light and truth.—*A. Wheatley.*

HARVESTING ANTS.—While residing at Mentone during the spring of 1878, I noticed a most curious fact connected with the harvesting ants. When passing through an avenue of plane-trees, I observed some of their seeds apparently walking along, but on closer examination found them to be borne by ants (*Atta barbara*), which were carrying them to their nests. Everyone who has broken up one of the round balls of the plane-tree knows it to consist of wedge-shaped seeds tapering to a point, from whence springs a parachute of long reflexed hairs. The ants were carrying these seeds along by the broader end, and on arriving at the nest attempted to pull them down. But the hairs naturally stuck in the entrance of the nest and rendered it difficult or nearly impossible to draw in the seeds. Several times I took out the seed and placed it with the narrower end—the end from which the hairs spring—downwards, in which case there would have been little difficulty for the ants to get them in. But they almost invariably took the seeds out and put them in the other way. Thus it took a long time to take down each seed, and before they had dragged in many, a great number were accumulated outside; the ground round some of the nests being thickly strewn with them in all directions, for the distance of three or four inches. After laboriously bringing the seeds into their nests, the ants nip off the hairs and throw them out into a rubbish heap or midden. If they were to nip off the hairs *before* dragging them down, or turn them the reverse way, they would, one would naturally suppose, save much time and trouble. I have enquired of several friends, but none of them seem to have noticed this peculiarity; nor does Moggridge mention it in his work on "Harvesting Ants and Trapdoor Spiders." Can you or any of your readers throw a light on this apparent stupidity in insects usually so sagacious?—*G. H. Bryan.*

THE "GRIDING" OF TREES.—Our Poet-Laureate, in his "In Memoriam," has referred to the aspect of a wood in winter, saying that it "grides and clangs" its many branches, and the distinction between the words is, I find, missed by some readers of the poem. "Gride" is a word of good antiquity; we have a derivative from it in the familiar word "gridiron." Milton has the word "gride" in the sense of "cut," which does not suit Tennyson's application of it here. Seemingly he means the stridulous or creaking sound that the boughs of some species produce as they sway in the wind, contrasting with the deeper sound that is indicated by the word "clang."—*J. R. S. C.*

SHOWER OF POLLEN.—In reference to the notice of a "shower of pollen" at Windsor in SCIENCE-GOSSIP, I would say that a similar phenomenon was noticed by a friend of mine in the same town towards the end of June, especially covering the surface of a fountain and some water butts standing in the garden.—*E. G. H.*

LEAVES OF RHUBARB.—Ever since I tasted in Brussels, seven years ago, the delicious dish which can be made from rhubarb leaves, I have urged upon all my friends to try it, and it has been almost universally appreciated by those who like spinach, as, when properly prepared, rhubarb leaves resemble that delicate vegetable very closely, only possessing a slightly more acid flavour, which, however, is most refreshing. To prepare the leaves for the table, the younger ones only should be used; after taking out the ribs and coarser parts, the leaves should be treated similarly to spinach. After boiling, they must be passed through a fine sieve, and then served up either with a little butter on toast or with rich brown gravy.—*Hastings C. Dent.*

UNDER WHAT CIRCUMSTANCES IS THE YEW FOLIAGE POISONOUS TO CATTLE?—A diversity of opinions has, within the last few months, been offered on this subject, and your correspondent "J. H. G. Kettering," who has asked this question in the July number of SCIENCE-GOSSIP, may like to hear some of them. Many persons have affirmed that the yew is only hurtful in a dry or withered state, that the fresh foliage was eaten with impunity by cattle, but that the lopped, dying branches invariably proved injurious. Most poisonous plants lose a portion, if not all, their poisonous properties by dying, but not so the yew, according to old-fashioned notions. The number of deaths that have occurred lately in consequence of cattle having partaken of *fresh* yew leaves led to inquiries which resulted in an opinion to the following effect, namely, that the female yew-tree is poisonous, the male not. But this idea has been set aside by the fact that in several instances horses have eaten yew foliage and escaped injury, when other horses, on another occasion having devoured the same trees, have died. An old gentleman, a friend of mine, assures me that "drinking does the mischief." Cattle may, he says, eat *fresh* yew leaves, and escape if they do not drink water for a few hours after their dangerous meal, and I feel very much inclined to think he is right, for a gentleman farmer, living near Less, lost two valuable cart horses lately from the effect of yew poisoning. The animals had been left standing under the tree while the carters were loading, and had, unfortunately, been allowed to drink very shortly afterwards at a stream on their way home; both horses died in the course of three hours to the great astonishment of their owner, who said that "his cattle had browsed those very trees for the last ten years, and he had never known one of them injured before."—*H. E. Watney.*

"BLACK CORAL," &c.—Can any reader of the SCIENCE-GOSSIP give me any information concerning the so-called "black coral," sold to visitors at Capri? I have a specimen, but feel great doubts as to its being coral at all. I saw in the August number of SCIENCE-GOSSIP (p. 187) a mention of double *Cardamine pratensis.* A quantity of this plant was growing with double flowers last spring on the south-west side of Shotover hill, near Oxford. Is this a peculiar phenomenon? Can any one tell me if Gilbert White was the author of the twenty-six letters on the "Antiquities of Selborne," published in the edition of White's Selborne, with notes by Frank Buckland (Macmillan and Co., 1875)?—*A. M. C. T.*

RELAXING LEPIDOPTERA.—I have for some years had in my possession a fine specimen of the death's head moth (*Acheronta Atropos*), which was captured at Northallerton many years ago. It had never been set out, and so its wings were folded over its back, the upper ones alone being visible. I succeeded last week in making a very fine cabinet specimen of it, by floating it on a piece of cork, in a basin of boiling water, covered at the top, for a few hours. I was then able to pin it out almost as easily as a fresh specimen, and it has kept its position ever since.—*J. A. Wheldon.*

WORKS ON APHIDES.—In reply to Mr. A. C. Smith's inquiry for a work on aphides or plant-lice, let me strongly recommend Buckton's "Monograph of British Aphides," with excellent coloured plates, drawn under the camera lucida. It is published by the Ray Society, and will be completed in three volumes, the two first of which have been published. By applying to Mr. Wm. Wesley, Natural History Bookseller, 28 Essex Street, Strand, London, who purchased the work for me, I have no doubt Mr. Smith will be able to obtain it. The coloured drawings comprise not only several forms of each species, but also many of the insects which relate to the aphis, such as the ants, sylphidæ, aphidivorous ichneumonidæ, &c. It is however a pity that the leaves of this and some other works on Natural History are not even cut before being issued for sale. Much time is thereby lost in turning over one by one the uneven edges to find any particular plate. Surely the expense of cutting them by machine must be very insignificant, and it would be a great boon to readers to purchase them evenly cut.—*William C. Tait.*

DUTCH CLOVER.—The abnormal state of the flowers of *Trifolium repens*, as described by Mr. W. E. Green, has been a very common phenomenon at Darlington this year. I have also found several plants in a viviparous condition. Professor Henfrey, in his "Elementary Course of Botany," states—"In wet seasons it is not uncommon to find flowers of the white clover, with more or less of the organs modified in this way; the pistils, one or more of the stamens, &c., appearing in the form of green leaves, occasionally compound or ternate, as in the stem below." Although I have examined a large number of specimens in this condition, I have not as yet found one in which *all* the floral organs were converted into leaves; there invariably being portions of the petals and stamens of the normal shape and colour.—*J. A. Wheldon.*

OUR SINGING MOUSE.—Some little time since we had a mouse which made its home in a little cupboard adjoining our kitchen firegrate. At first it was remarkably shy, but in a few weeks I tamed it, so that it would come to my hand for its evening supper; then it would sit up on its hind legs on the hearthrug and sing. The song was very like the low warbling of a thrush. In time I came to look regularly for my visitor, for I often sit up alone for about an hour after all my family have retired to rest. If any of the household stayed with me to see my little singer, it would not make its appearance; the only way to hear it was by keeping out of sight, and being very quiet in the lobby. I am sorry to relate it fell a victim to our Manx cat, who, one evening, unknown to myself, had not been turned out of the house—thus ended the life of our songster.—*R.*

SHELLS OF BROOD EGGS.—In reply to F. M. W.'s query as to what birds do with the shells of their eggs after the young brood is hatched. Some swallows returned to their nests in the eaves of our cottage at Clevedon, Somerset, this year, and have also added two nests since they came back. Our children take great interest in their movements while hawking flies and returning to the gaping mouths of the little ones. My little girl showed me the shells lying amongst the plants just under the nests; they had evidently been thrown out as soon as hatched. This the birds would have no difficulty about; the little beaks, which make such an excellent trowel, would serve admirably as a forceps. —*W. G. G.*

SHOWER OF POLLEN.—In reply to H. G. Wheeler, in the August number of SCIENCE-GOSSIP, I beg to say I also noticed the shower of pollen at Windsor, on June 8th.—*A. Davis.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

H.—The notion that hedgehogs sucked cows has long since been exploded. It is utterly impossible, from the structure of their mouth and teeth, for hedgehogs to do anything of the kind.

F. CROSBIE.—Your sketch is evidently a figure of the bee-louse *(Braula cœca)*, a singularly degraded dipterous insect. The commoner parasite of the honey-bee is a tick, and possesses eight legs.

D. D.—The proceedings of the British Association can be purchased each year for one guinea, from the secretary. But the best lectures, addresses, and papers usually appear in "Nature."

J. W. J.—The tree which produces the well-known Brazil-nut of commerce, is called *Bertholettia excelsa.* The so-called "nuts" are in reality seeds.

J. W. WARD.—The "projections" on the leaf are monothalamous or single-chambered galls, produced by a species of aphis, probably *A. bursariæ.* Yes. Jackdaws will eat the eggs of other birds if they have the chance.

T. G. HARRIS.—Get the pamphlet "How to Choose a Microscope," price 1*s.*, published by D. Bogue, 3 St. Martin's Place, Trafalgar Square, London. It will give you full instructions as to terms, &c. Beck's economic microscope is an excellent instrument. Davis's "Preparation and Mounting of Microscopical Objects," price 2*s.* 6*d.* (same publisher), will give you full instructions as to that department.

MISS F.—The leaves on which the "singular growth" occur, are those of the ground ivy *(Glechoma hederacea)*. The nipple-like "growth" is caused by a species of aphis, puncturing the skin of the leaf, and depositing its eggs therein.

R. Renton.—Accept our best thanks for specimen of *Potamogeton zizis.*

Medicus.—As you will have seen, the "American Quarterly Journal of Microscopy" is unfortunately to be discontinued at the end of the present year. The back numbers might be obtained through Messrs. Trübner, Ludgate Hill.

W. H. Littleton.—The labels for geological specimens are usually written out; we are not aware of any printed ones. Lists of British coleoptera for labelling may be had of E. W. Janson, 28 Museum Street, London, W.C.

W. A. K. (Salford).—It is the hemp nettle *(Galeopsis versicolor)*, often found in potato fields, abundant about Warrington.

E. D. B. (Sidmouth).—It would be difficult to name the plant with certainty from your short description, but we should imagine it would be the privet *(Ligustrum vulgare)* you saw.

T. L. (Heywood).—The specimen sent is a common British plant, yarrow *(Achillea millefolium)*, though the pretty variety you enclose is rare.

J. B. B. (Dudley).—We never met with the symphytum with pink flowers, although the petals, soon after the ovules are fertilised, often assume a pinky tinge; it is probably *S. patens* (Sibth.).

C. H. G. (Clifton).—The flower is the sea lavender *(Statice caspia*, Willd.). The leaves of the tree were too much withered to identify. Could you send a dried specimen?

F. B. (Cambridge).—Your specimen is the *Phyteuma pauciflora.* It is rare; on the higher hills it becomes more frequent. *Vide* "Holiday Rambles on High Lands."

R. F. Z.—Some of the leaves were attacked by the *Aregma obtusatum*, a small microscopic fungus, called a brand.

F. C. K. (Aberdeen).—The species enclosed is the hound's tongue *(Cynoglossum officinale)*, not very common.

F. H A. (Fishbourne).—We are not sufficiently acquainted with *Chenopodium paganum* to venture an opinion; we should name it *C. viride* (L.).

T. G. H.—We believe it is a very rare species, the spider orchis *(Ophrys fucifera*, Sm.), at all events it is not the frog orchis *(Habenaria)* as you have been led to suppose; it is worth looking for; try to find good specimens next year.

Erythræa.—A very luxuriant example of *E. pulchella* (Fr.).

EXCHANGES.

A few beautiful plant hairs, and other slides. Also Pepper's "Cyclopædic Science," in exchange for Davies' "On Mounting," Slack's, or other good work on pond life.—Jas. Blackshaw, 57 Cross Street, South Blakenhall, Wolverhampton.

Wanted, mammalian skulls. Offered recent shells, serpents in spirit, fossils, or osteological help.—T. Stock, 16 Colville Place, Edinburgh.

Wanted, a good micrometer, in exchange for pair of nearly new stage forceps, with objects (approval).—E. Clover, Springfield Lodge, Sudbury, Suffolk.

Wanted, Irish and European Potamogetons; and European Orobanches, for rare British plants.—A. B., 107 High Street, Croydon, Surrey.

Eggs of the lesser black-backed and black-headed gulls for exchange. Unaccepted offers not answered.—E. F. Bell, 11 James Terrace, Tait Street, Carlisle.

Clean specimens of soundings, containing "orbulina," &c. (with localities), mounted; also slides of fossils, foraminifera, &c.: to exchange for marine deposits or geological material, not necessarily microscropic.—E. Lovett, Holly Mount, Croydon.

For cuticle of Yucca send a stamped directed envelope to W. H. Gomm, Waltham Abbey, Essex.

Full and easy directions to extract jaw and teeth of blowfly in exchange for any well-mounted slide of insect dissections —sections of coal or spines, Foraminifera or Polycistina.—G. H. Wrapson, Albert Road, Southsea.

British shells, plants, and mosses (correctly named), or living plants of *Trichomanes radicans*, and fine specimen of *Todea superba*, in exchange for foreign shells.—T. Rogers, 27 Oldham Road, Manchester.

Well-mounted slides of *Arachnoidiscus Ehrenbergii*, "selected," for other well-mounted slides: diatoms, parasites, or geological sections preferred.—H. Morland, Cranford, Middlesex.

Wanted, Bentham's "Illustrated British Flora," in fair condition, in exchange for Cook's "Fungi," 2 vols., uncut.—J. C. White, Montpellier, B. Salterton, Devon.

Have Science-Gossip for 1872 and 1878, unbound, to exchange for diatomaceous material or slides.—A. Alletsee, 11 Foley Street, Langham Place, W.

"London Catalogue" offered. Nos. 12, 33, 49, 79, 93, 96, 111, 113, 265, 266, 277, 316, 591, 714, 727, 803, 1003, 1020, 1036, 1129, 1259, 1310, 1323, 1504, in exchange for any of the following: 180, 197, 204, 374, 411, 421, 518, 598, 529, 538, 864, 907, 913, 928, 929, 1236, 1282, 1292, 1299, 1431, 1522, 1545, 1610, 1611, 1621, 1622, 1631, 1632.—W. Jones, 32 Manchester Street, Oldham.

Wanted, a copy of Stark's "Popular History of British Mosses." Reply, stating price, to S. M. P., 2 Westerhall Villas, Weymouth.

Mosses, about 100 Somersetshire species in exchange for others. Lists exchanged.—W. E. Green, 24 Triangle, Bristol.

Wanted, common objects for the microscope, mounted or unmounted, in exchange for mounted objects. Send list to Amateur, care of W. H. Symons, 2 Queen's Terrace, St. John's Wood, N.W.

One or two works on entomology, list sent. Desiderata, "Duncan's British Moths," or "Wild Flowers," by Shirley Hibberd, published by Routledge.—W. Thomas, care of —— Bayley, Esq., Billing Road, Northampton.

I have a few slides of Japanese bibulous paper, splendid polariscope object, to exchange for other well-mounted microscopic slides.—W. G. Daish, Melville Street, Ryde, I.W.

Lyell's "Principles of Geology," 9th ed., and Darwin's "Descent of Man," 2nd ed., for standard works on geology, biology, &c.—J. A. Lee, Todmorden, Lanc.

Foraminiferous deposit from the west coast of Ireland, in exchange for good micro objects (mounted) of any description.—Henry Hyde, 2 Ellesmere Street, Regent Road, Salford.

A great variety of sections of wood, pith, and other vegetable structures, in exchange for mosses, etc. Exchange lists.—H. J. R., 184 High Street, Brentford.

Wanted, 20, 33, 79, 97, 131, 133, 165, 206, 218, 277, 452, 476, 515, 615, 841b, 846, 868, 1057, 1057b, 1058, 1084, 1092, 1160, 1169, 1468, 1537, in "London Catalogue of British Plants," for other plants.—H. Searll, 110 Old Street, Ashton-under-Lyne.

Haldon greensand, and other fossils; also several hundred polished specimens of madrepores; 1000 sections of corals for microscopists, and shell sections. Wanted a variety of good foreign cones, no matter if the lips of cones are a little broken. Shells must not be too small.—A. J. R. Sclater, Mineralogist, 4 Bank Street, Teignmouth, Devon.

Wanted, English and foreign colepotera and lepidoptera, as English pupæ of moths and butterflies, in exchange for foreign stamps and named British plants.—F. S. L., 2 Oakland Villas, Redland, Bristol.

Works now publishing; 51 parts of Chambers's "Encyclopædia," 30 of "Familiar Wild Flowers," 22 of "Science for All," 18 of "European Butterflies," for good microscope, or dissolving views lantern, or chemical or electrical apparatus.—J. S. Ilsby, 6 Trevethen Terrace, Falmouth, Cornwall.

Cornish minerals, and crystals, for magic lantern slides, or chemical or electrical apparatus.—J. S. Ilsby, 6 Trevethen Terrace, Falmouth, Cornwall.

Palates of shell fish, well-mounted and stained, in exchange for shells, moths, butterflies, birds' eggs, and minerals named and localised.—A. D. Innes, 10 Canon Street, Edinburgh.

"London Catalogue," 7th ed., 85, 626. *Potamogeton zizis*, m and k, and others, in exchange for plants or mosses.—R. Renton, Fans, Earlston, N.B.

Will send a number of caterpillars, *Bombyx rubi*, by sending box and stamps for return.—R. Renton, Fans, Earlston, N.B.

Beautiful groups of preserved ferns and flowers, quite art gems, which I wish to exchange for micro slides, lepidoptera, zoophytes, seaweeds, or other natural history objects of interest. —M. Medhurst, 1 Gladstone Road, Liverpool.

Fine series of igneous and metamorphic rocks of Charnwood Forest; also various minerals and fossils, in exchange for similar specimens from other localities.—F. G. S., 3 Melbourne Road, Leicester.

BOOKS, ETC., RECEIVED.

"A Dictionary of Plant Names." By James Britten and Robert Holland. Part i. London: Trübner & Co.

"Lectures on the Geology of Leighton Buzzard." By E. W. Lewis. A. P. Muddiman, Leighton Buzzard.

"Transactions of the Cardiff Naturalists' Society, 1877-78."

"Transactions of the Norwich Naturalists' Society," Vol. iii., part 5.

"Proceedings of the Norwich Geological Society," Vol. part 3.

"Transactions of the Watford Natural History Society Vol. ii., part 5.

"Midland Naturalist." September.

"Land and Water." September.

"Journal of Applied Science." September.

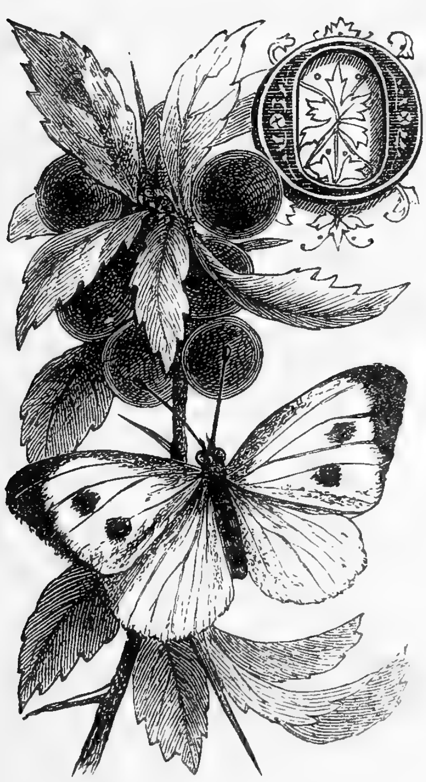
"American Naturalist." September.

"Botanische Zeitung."

&c. &c. &c.

Communications received up to 10th ult. from:—H. L.—F. K.—A. A.—W. R.—J. F. R.—E. C. R.—W. E. G. —C. U.—T. B. W.—T. E. J.—C. P.—G. H. W.—T. R.—B. L.—H. M.—A. D.—W. J. H.—J. C. W.—F. C.—D. D.—W. H. G.—G. R. V.—W. D.—F. B.—E. E.—W. D.—W. H. G. —A. B.—E. F. B.—E. C.—G. M. L.—A. M. C. T.—C. McI. —J. A. W.—J. P.—E. L.—J. B.—Y. M.—T. S.—W. I.—J. P. T.—J. H. A. J.—W. H. L.—W. H. S.—S. M. P.—W. G. D.—A. J. R. S.—J. M. J.—T. G. H.—J. A. L.—H. H. —H. S.—J. S. B.—H. J. R.—W. M.—H. C. D.—J. S.—W. T —J. S. I.—F. S. L.—R. R.—W. S.—J. W. O.—C. H. D.—A. D. I.—H. P. M.—M. M.—J. W. W. B.—G. R. V.—H. W. S.—&c.

A GOSSIP ABOUT NEW BOOKS.



OWING to the pressure of other articles, we have been unable to give attention to many new books and new editions which have been sent us for notice, until quite a small library has collected on our table. First among them calling for attention is a new edition of that well known and most readable of books, Professor Johnston's "Chemistry of Common Life" (London: W. Blackwood & Sons). It is edited by a chemist upon whose shoulders in a great measure Professor Johnston's mantle has descended, Professor Church, who has caught up the spirit of the original author in his revisions and eliminations, no less than in the additional new knowledge which has brought the book abreast of modern discoveries. To revise and edit a book like this is no thankful task, and we know of nobody who durst have adventured it with any chance of success, except Professor Church. As now given to the world, "The Chemistry of Common Life" is a most valuable work.

Dr. Noad's "Student's Text-Book of Electricity" (London: Crosby, Lockwood, & Co.) is the other widely known book which now appears in a revised and enlarged form. It is a work which needs no criticism, for its character as a text-book has long been gained. But no modern science has been such an enormous gainer, either in its facts or the philosophical explanation of them, as electricity. To refurbish an excellent but old established manual, with all the new matter and new views, is both a delicate and an important task. But the work has been entrusted to Mr. W. H. Preece, and it is unnecessary to add that it is admirably done. The student now possesses a compendious and clearly drawn up manual of modern electricity. "The Manual of Bee-keeping," by John Hunter (London: D. Bogue), has gained a third edition, which sufficiently proves that the public have taken it under their protection. This new edition is thoroughly revised and greatly enlarged, and, both as regards type and general appearance, has gained in its attraction. The same may be said of an older and even more general favourite, Mrs. Lankester's "Wild Flowers worth Notice" (London: D. Bogue), which never before appeared in such a glory of coloured plates and gold as it does in this new edition just issued. This book is also revised throughout, and the coloured plates have been greatly improved, both from artistic and botanical points of view.

Two volumes which have caused great discussion among philosophical naturalists during the past twelve months are "Life and Habit" (London: D. Bogue), and "Evolution, Old and New" (London: D. Bogue), both by the same author, Samuel Butler, whose "Erewhon" has its authorship now acknowledged. Those who have read the latter most delightful and cleverly written book, in which picturesque descriptions worthy of Defoe, humour resembling that of Swift, and trenchant satire not excelled by any author in our language, are blended in the most surprising fashion, will naturally turn towards these two volumes from the same author with high expectations. We therefore think it savoured of the greatest temerity for Mr. Butler to enter into a discussion for which he had not been prepared by any scientific training. All that can make a book lively in point of style is present in both the works under notice, and particularly in "Life and Habit," which we like by far the better of the two. It is often pregnant with large and novel suggestions, and will always be a valuable contribution to speculative literature. Mr. Butler's freedom from restraints of any kind gives his books a breeziness which is very enjoyable. In his "Evolution, Old and New," there are many capital "hits" at the weaker places in Darwinism; but the author seems to us never to have quite risen to the position of thoroughly acquiring

a clear knowledge of the doctrine and bearing of natural selection. This is unfortunate to the Darwinians, for we feel certain that if Mr. Butler had been a convert, he would have been a most valuable one. Again, in his "History of the Doctrine of Evolution," his lack of special knowledge is very manifest, when compared with the article on the same subject in the new edition of the "Encyclopædia Britannica."

Mr. Butler's genius prompts him to adopt an evolutional philosophy of his own. This is significant, for "Evolutions" have become rather plentiful of late, and have been evolved by men of such extremely opposite modes of thought as Professor Mivart and Mr. Samuel Butler. But the fact shows that an evolutional hypothesis of *some kind* is felt to be necessary in both formulating and explaining the material phenomena of the universe. Notwithstanding these remarks, Mr. Butler's "Evolution, Old and New," is a charming book, very thoughtful, wonderfully clever, candid, even to a boldness we have hardly yet learned to recognise as we always ought to recognise the simple telling of what a man firmly believes to be the truth; and the fact that men like Wallace and others have thought fit to earnestly enter the lists with Mr. Butler, in defence of their own theories against his attacks, is one of the best proofs we could adduce of the fertile cleverness of the volume.

"Natural History Rambles Underground," by J. E. Taylor; "Mountain and Moor," by J. E. Taylor; "The Seaside," by Professor Martin Duncan, F.R.S.; "The Woodlands," by Dr. M. C. Cooke; "Lane and Field," by the Rev. J. G. Wood, F.L.S., and "Lakes and Rivers," by C. G. Napier, F.G.S. These six volumes have recently been published by the Society for Promoting Christian Knowledge, and are intended to serve as cheap and popular handbooks to the fauna and flora of the British Islands. Dr. Cooke's book is, as might be expected, most clearly and attractively written; Professor Duncan gives a good deal of new information respecting marine animals, and discourses agreeably also on maritime plants and seaside geography; the Rev. J. G. Wood is a natural history companion who needs no introduction, and his little book is therefore in no need of recommendation. Altogether, we think the Christian Knowledge Society have acted wisely in thus endeavouring to keep pace with the times. It is not long since geology was deemed too dangerous a subject for the Society to take up, but we are glad it is now seen that the Christian faith need stand in no petty or jealous fear of the advancement of true science.

"Organic Chemistry, Practical and Theoretical," by Hugh Clements (London: Blackie & Son), is intended as a handbook for colleges and schools, medical and civil service examinations, and especially for the honours students at the classes of the Science and Art Department, South Kensington. But if the "honours students" were to repeat in their papers some of the blunders and statements to be found in this little volume, we feel positively certain they would never "pass." "A Treatise in Popular Language on the Solar Illumination of the Solar System, or the Law and Theory of the Inverse Squares; being an analysis of the two received laws relating to the Diminution of Light by Distance, wherein it is shown that, according to undisputed facts of Nature and of Science, the Solar Illumination is equal throughout the whole system, and the Law of the Inverse Squares Physically Impossible," by Collyns Simon, Hon. LL.D. Edin. (London: Williams & Norgate), is a book we do not understand.

The "Outlines of Field Geology," by Archibald Geikie, LL.D.; F.R.S., &c. (London: Macmillan & Co.), is a small—too small—volume, ably and clearly written, and which cannot fail to take its place as one of the best introductions to the study of geology. It is gratifying to find that such distinguished men of science as Professor Geikie do not think it derogatory to their position to write elementary manuals. The "Flowers of the Sky," by Richard A. Proctor (London: Strahan & Co.), is another clever and well written book by this indefatigable author and lecturer; and it puts the general reader pleasantly in possession of the newest and grandest views relating to astronomical science. "Electrical Lighting, and its Practical Applications," by J. M. Shoolbred, B.A., &c. (London: D. Bogue), gives a well written and illustrated account of all that is known concerning electrical lighting, with the results of recent examples. The "Annual Record of Science and Industry, for 1878," is an American work, ably edited by Spencer F. Baird, and published in London by Trübner & Co. The recording of the most important discoveries in the different branches of science has been entrusted to distinguished specialists, so that the results are valuable from their trustworthiness.

THE GEOLOGY OF THE LINCOLNSHIRE MARSHLAND.

By A. J. Jukes-Brown, B.A., F.G.S., &c.

[*Communicated by permission of the Director-General of H.M. Geological Survey.*]

Most people are sufficiently acquainted with the physical geography of Lincolnshire to be aware that the eastern border of the country is formed by a narrow strip of low-lying land known as the *Marshes*, or the *Marshland*. Stretching southwards from the mouth of the Humber, between the sea-margin and the eastern slope of the Wolds, it extends as far as Gibraltar Point and Wainfleet, where it opens upon the broader level of the great Fenland.

The greater part of this district is below the level of the spring tides, and would be constantly under

water, were it not for the long ridge of sand hills which form a wall of defence, and are sufficient to protect the marshes from the influx of ordinary tides or storms; in some places, where the natural earthwork is low and narrow, supplemental banks have been constructed, to provide against the more violent inroads of the sea. Thus protected, the land is now so well drained as no longer to merit its old designation of the marshland, though it is not always secure from inundation by inland floods.

Any one landing on the Lincolnshire coast, opposite Louth or Alford, would find himself on a sandy shore in front of the sand-ridge, which rises in many places to a height of fifty or sixty feet above low-water mark, and is thickly overgrown with the marram grass and sea-buckthorn (*Hippophäe rhamnoides*). Climbing over this he would descend on to a level, cultivated plain, varying in width from three to five miles, and exhibiting some of the best land in Lincolnshire. Crossing this flat country, our explorer would observe its sea-like expanse stretching away to the north and south in unbroken monotony, but passing westward, he would eventually find himself among low mounds resembling islands and promontories, between which the level surface of the plain is prolonged in bay-like inlets; every contour forcibly recalling the time when the marshland was yet in process of formation, and when the tide ebbed and flowed round the muddy shores of these slight elevations.

The older land, of which these mounds and spurs are the outlying portions, extends thence to the foot of the Chalk Wolds, it presents a more diversified surface than that of the outer plain, as indicated in the accompanying sketch-map; and forms a kind of border land between the Wold and the Marsh. Instead of the brown silty clay which constitutes the soil of the marsh, this strip of hummocky and undulating ground includes a variety of soils—boulder-clays, loams, sands, and gravels, with occasional hollows and interspaces, where the black peaty soil attests the former presence of fenny pools and lakelets. It is only, indeed, within the last fifty years that these hollows have been thoroughly drained, and old inhabitants can well remember the time when they rowed their punts and hunted wild fowl over the spots that now present such a different aspect, for the dark waters and the rustling rushes of the olden time have given place to acres of ploughed land and fields of waving corn.

Such a country would not at first sight appear to promise much of geological interest, but the numerous deep wells which have been sunk in this part of Lincolnshire, afford excellent sections of the deposits which underlie its surface, and disclose some facts of interest and importance. Many of these wells are bored completely through all the more recent deposits into the solid chalk which lies below them, and from the data thus obtained it is possible to construct something like a comprehensive outline of the geological history of the district. I propose, therefore, to take two instances in which the total thickness of material between the chalk and the present surface was thus ascertained; and will endeavour to show by what agencies, and under what conditions the successive members of the series have been accumulated.

Subjoined are the particulars of two borings selected from the many which have been communicated; both places are on the coast, the first about six miles north-east of Alford, and the second about the same distance due east of that town.

I.—Boring at Mablethorpe.

		Feet.
Post-glacial.	Stiff brown clay	8
	Soft "buttery" clay	11
	Soft brown clay or silt, with black peaty matter in places	27
Glacial.	Stiff clay with a few stones	20
	Sandy clay	4
	Stiff clay with small chalk débris	7
	Chalk rubble	6
	Solid chalk	12
		95

II.—Boring at Anderby.

		Feet.
Post-glacial.	Soft brown clay, with marine shells	20
	A bed of turf or peat	1
	Sand and silt	4
Glacial.	Stiff marly clay, with bits of chalk	52
	Sand and chalk rubble	10
	Solid chalk	12
		99

It will be noticed, that though the distance from the surface of the chalk to the surface of the ground is nearly the same in both instances, yet the terms of the intervening series of beds differ considerably. It will also be seen that these deposits are capable of being separated into two groups, and that the chief point of difference consists in the greater thickness of the lower group in the latter boring; the explanation of this fact will be found in the sequel. It will be obvious, even to non-geological readers, that in deciphering the history of these deposits, we must read the record from below upwards, beginning with the period when the oldest were formed, and trace the succession of events from that time to the present.

As we are not now concerned with the formation of the chalk, we need only remark that it is continuous under all the newer deposits, and forms the base or floor upon which they rest. Commencing, therefore, with the newer beds which were laid down on this floor, we find first a rubble of chalk and sand, and then a thick mass of a peculiar kind of clay, which is distinguished from all others by the fact of its containing numerous small pieces of chalk. Near the coast these beds are buried under a newer formation, but westward they come to the surface, and form the undulating ground between the flat marshes and the steep slope of the chalk wolds.

* If we enter any brickyard where the clay is being dug, we shall find it to be stiff brown clay, often mottled

* The greater part of the following description is reprinted from an article published in the *Louth Times* of June 21.

with bluish-grey, not arranged in regular layers, but forming a massive deposit full of chalk débris, together with some larger stones and boulders.

This kind of material is known to geologists by the name of "boulder clay," and this particular deposit is known as the "Hessle boulder clay," from the name of the place where it was first studied and described. Fifty years ago all such deposits exhibiting signs of tumultuous arrangement used to be attributed to the agency of Noah's flood, but subsequent inquiries showed that this was a mistake, and that *moving ice* was the real agent concerned in along over the rocky bottom with resistless power; they have seen also that the rocks over which the ice passes, are likewise deeply grooved and scratched by the same means. When therefore we find a deposit full of such ice-scratched stones, we know that ice must once have moved over the ground which it occupies, and it is now an ascertained fact in geology that there was a time when the British Isles were surrounded and smothered with ice; this time has received the appropriate name of the Glacial Period, and it is to the later part of this period that the Hessle boulder clay belongs.

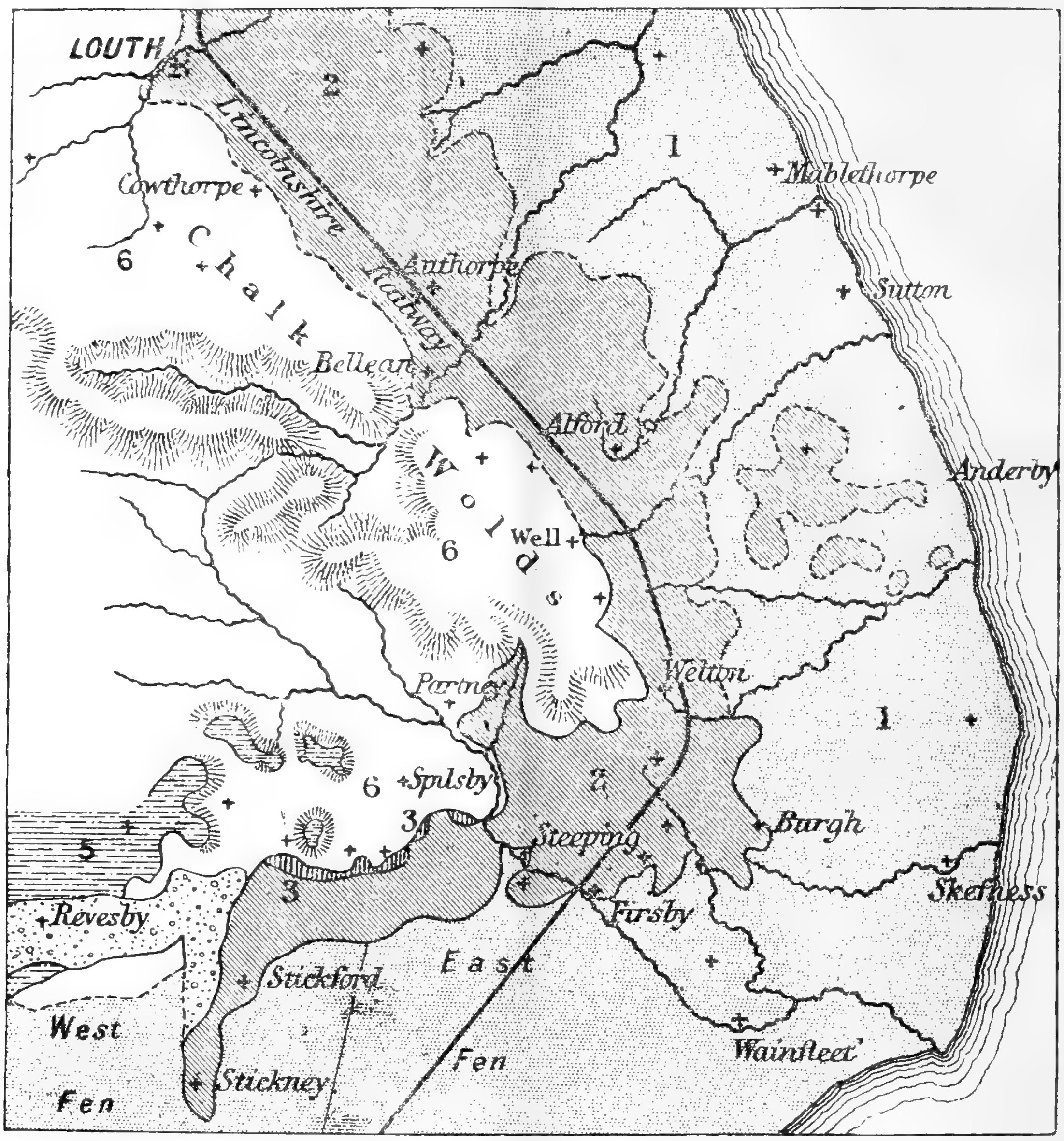


Fig. 179.—Map of the Lincolnshire Marsh Land. Scale about five miles to one inch. 1. Marsh and Fen; 2. Hessle clay; 3. Sandbanks; 4. Gravel and sand; 5. Chalky clay; 6. Cretaceous rocks.

the formation of such clays. But how, it may naturally be asked, can geologists be sure of this? The answer is simple, because the stones and boulders in the clay exhibit marks which can only be made by the action of moving ice. These stones are to the geologist what coins are to the antiquary—they bear inscriptions which are records of the times to which they belong. Men who have seen ice at work on Arctic shores, or who have been into ice-caves under the glaciers in Switzerland, have seen how such marks are made,—how the blocks and stones, frozen into the ice, are scratched and ground as they are forced

A mere inspection of the clay itself, however, will not tell us all that we want to know. There are several different forms of moving ice on the surface of the globe. The glacier which sweeps down a mountain valley; the iceberg, or ice-floe, which grounds in shallow water; the ice-foot, or coast-ice, which surrounds all shores in the northern regions; all these forms of ice are supposed to be capable of producing boulder clay, and further inquiry is necessary before we can discover which has been the agent in the formation of this Hessle clay.

Now there are several remarkable points connected

with its mode of occurrence, which help us in forming an opinion regarding its mode of origin. In the first place, it only occurs on the seaward side of the wolds, entering the Steeping valley and the east fens as if it would if it were a coast deposit, and these were bays in the coast-line of the period. Again, the beds of sand and gravel which occur in and underneath the clay frequently contain sea shells like those now living on the coast. Finally, it would appear that the boulder clay is banked up against the chalk hills to a depth of 40 or 50 feet in some places, and that if we could strip it all away we should find a steep scarp or cliff of solid chalk, like the cliffs of Flamborough Head, only not quite so lofty. These buried cliffs begin at Welton-le-marsh, and pass a little west of the following places—Well, Rigsby, Belleau, Muckton, Cawthorpe, and Louth (see map); and probably northward to the Humber.

For these and other reasons it is believed that the Hessle boulder clay has been produced by the action of coast-ice against the Lincolnshire shore. In order therefore to realise the physical conditions which prevailed at the time when it was being formed, we must read the descriptions given by those who have sailed in Arctic seas, or have visited the northern shores of the American continent. They tell us that the freezing of the sea round the coast produces a shelf of ice, many feet high and sometimes a hundred feet broad, which is called the ice-foot, this clings to the coast all the winter, and from the steeper parts of the shore tons of rock rubbish fall upon its surface, while outside its edge icebergs and loose sheets of ice float in the sea. When spring-time comes great storms arise which loosen the ice-foot and break up the floes outside, driving the latter against and on to the former; in this way great masses of ice are often piled up against the coast, and where the shore is sloping these are often driven far into the land, crashing and grinding over the rocks of which it is composed. After the storms comes a brief but warm summer, the masses of ice begin to melt under the sun's rays and the mud and stones with which they are loaded are left in the shallows along the shore; the upper portion of this material is drifted and sifted by the tidal currents, but the greater part probably remains as an unstratified boulder clay.

(*To be continued.*)

WHY FLOWERS TURN WHITE.—Could any of your readers explain the reason of some flowers turning white, such as the foxglove, when brought into a garden?—*M. F.*

A PECULIAR AMŒBA.

TWO years ago I obtained some water from a pond, in which, among other things, I found a very beautifully coloured Amœba, a copy of which I enclose. Having never seen any before like it, nor any description of such an one, I drew a sketch of it at the time. The general colour of the creature was of a very light bluish tint, very transparent, and the granules, of which there was a great number, were of a brilliant gold colour, the contrast of colour rendering it a very beautiful object. On reading Professor Allman's address, delivered May 24, 1876, at the anniversary of the Linnean Society, the subject of which was "On recent researches among some of the more simple sarcode organisms," I there find the following description of an Amœba, illustrated by a drawing, which appears to answer to the one

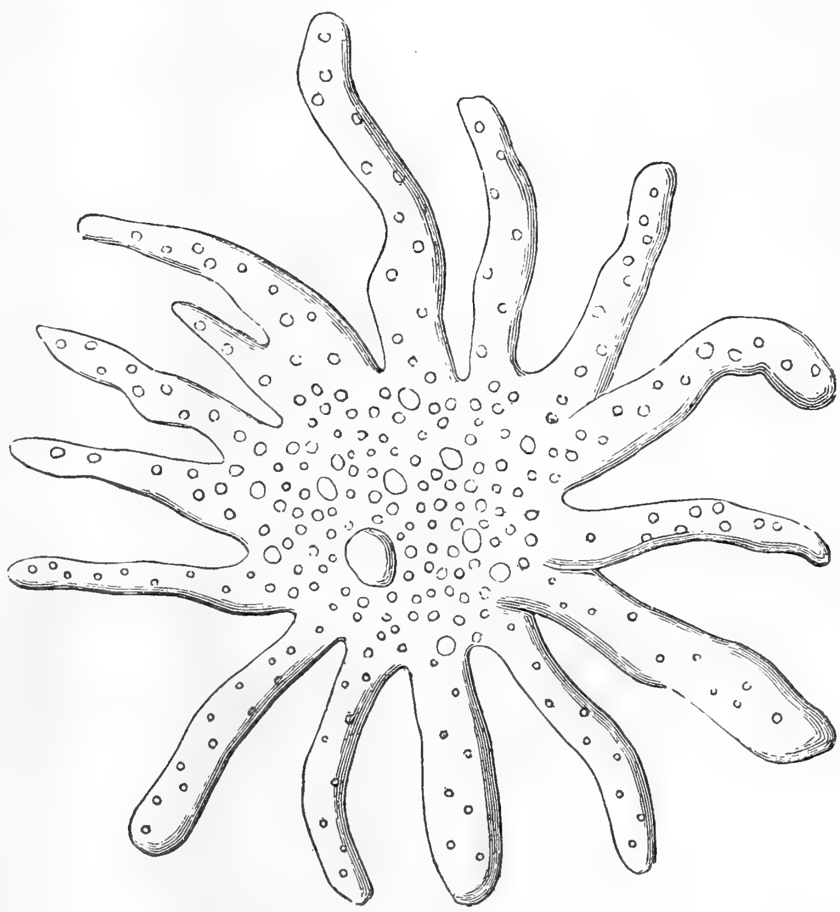


Fig. 180.—Peculiar Amœba (*Dactylosphærium vitreum ?*).

mentioned:—"Under the name of *Dactylosphærium vitreum*, Hertwig and Lesser describe a freshwater rhizopod which but slightly differs from Amœba. It has a roundish body composed of homogeneous hyaline protoplasm with a multitude of yellow or green strongly refrangent granules, which fill the whole of the interior of the body as far as a narrow hyaline margin. The pseudopodia are blunt finger-shaped processes which radiate in all directions from the surface, and consist of a perfectly homogeneous hyaline protoplasm. The mode in which the pseudopodia are withdrawn is peculiar. When one of these is about to disappear, it seems suddenly to change its form; its smooth surface becomes nodular

and irregularly sinuous, it conveys the impression of having suddenly lost its turgescence, and then it rapidly flows back into the body. Numerous non-contractible vacuoles exist; but the multitude of coloured corpuscles so interfered with the transparency of the protoplasm, that it was impossible to decide with certainty as to the presence of a nucleus. In a variety in which the yellow corpuscles are replaced by green, the whole, or part, of the surface is seen to be in most cases covered with fine villi-like processes, a condition very similar to one which has been frequently described as occurring in Amœba. Towards the centre of the protoplasm were numerous pellets composed of foreign matter, evidently the remains of nutriment derived from plants and ingested as in other amœboid organisms."

In the specimen I had, the rich yellow granules not only filled the body, but were thinly scattered through all the pseudopodia.

Canterbury. J. FULLAGAR.

ORNITHOLOGICAL ESSAYS.

No. II.—THE SPARROWHAWK (*continued*).

By TOM WM. DEALY.

THE sparrowhawk is a great destroyer of bird-life. In fact, birds constitute its exclusive food. Gamekeepers wrongly imagine that every bird which is lost out of their woods has been eaten by this hawk, which on these fallacious grounds is subjected to a rigorous persecution, and, as a consequent result, it becomes rare, and more rare every year. It is a great error that this bird, as well as all others comprised under the head Raptores, were not included in the Wild Birds Protection Act, because the birds they kill to support themselves are necessarily the weak and diseased ones in the flock, which cannot fly away quickly enough to elude the deadly grasp of the hawk; and which, if left behind, would in all likelihood sow more widely the germs of disease, and thus lead to a far heavier mortality than the hawks cause. Of course, my allusions now apply to game; for hawks are surely not begrudged any sparrows they may destroy. In mediæval ages both game and hawks were to be found in profusion. Then the sickly birds of a flock fell a prey to some hovering hawk. Why should not the same proportion exist now? In a few years hence the sparrowhawk will become like most of the genus—rare. It cannot but give pain to the feeling of every true ornithologist, to behold the rows of hawks which are nailed on the gable end of the keeper's house.

While spending my Midsummer vacations, I became acquainted with a keeper who inherited with his title all the inveterate hatred of his "caste" to hawks. I talked with him, but he would not be convinced. In the midst of a futile effort to wean him from his perverted opinion, I said, "Then bring me the next pair you shoot; we will examine them, and you will then see that I am right!" He smiled superciliously as he answered, "Well, I will, and I'll be bound to say, you'll find 'em stuffed with young game." I made no reply, because I saw that he was steeped in ignorance, and that anything I said would be of no avail.

He brought me a pair at noon next day, which he had shot that morning. I opened them in his presence that he might see the result himself. In the stomach of the first—a matured male—were the partly digested remains of a pigeon, species irrecognisable, but the presence of a foot told it was a pigeon. I made no comment, but proceeded to the stomach of the second. I found the undigested parts of some small bird, probably a robin or a linnet. Here was something for him! He was rather less decided, but with the most perfect nonchalance he extenuated his argument by attributing the absence of game from their stomachs to the constant watch he exercised over his young birds. However, I asked him to bring me the next hawks he killed. I chanced to be with him when he shot a pair—male and female. I again dissected in his presence. He expressed his unbounded confidence that we should find game in these, because he had lost a couple of young pheasants from his covers that very morning. He was mistaken. The male contained the several parts of a sparrow not yet so sufficiently digested as to be past recognition. I extracted both legs and claws quite uninjured from the mass of food. From the female I took the totally unrecognisable body of some large bird; which from fragmentary evidence we concluded must be a thrush. He promised to think about it, and examine for himself, and should he find his doubts still further strengthened, he would refrain from destroying them.

It may probably be of interest to many to read the following curious calculation, relative to the birds destroyed by the sparrowhawk.

Suppose there is one pair of sparrowhawks to every twenty square miles of the British Isles—which is a very moderate calculation far below the number. There would then be no less than 6075 pairs of hawks, in all 12,150 birds. Again, suppose each of these to consume three birds—sparrows we will say—per day. They would destroy 36,450 sparrows per diem, 255,150 per week, and 13,304,250 per year of 365 days! Let us suppose this immense number of birds to be in a flock, flying. We will allow each bird a square foot for freedom of movement. There would then be a compact mass of flying birds nearly a mile long and half a mile wide. What a mass of birds! And yet this is the amount which would be actually destroyed by the sparrowhawks of the United Kingdom in one year if left unmolested. Again, if the victims were placed in a cubical mass, say that each bird is five inches long, two wide, and one in depth, they would form a cubical mass which would completely fill a box a little over sixteen and a half

feet cubed; that is, a box sixteen and a half feet long, sixteen and a half feet wide, and sixteen and a half feet in depth. What a holocaust offered up at the shrine of agriculture! and yet it is rejected.

Again, were each bird to average two ounces, there would be a weight of 1,663,031¼ pounds, or about $742\frac{17}{40}$ tons. Endeavour to imagine the number of railway trucks they would fill. Farmers, Agriculturists, cannot you see the benefit which you would gain if the country were rid of all this? And yet we wantonly destroy the means which Nature has given you to obtain it.

Suppose each victim were to eat—we will not be extravagant—say 100 grains of corn (or its equivalent from the produce of the land) in a season; we will ignore that which they destroy and do not eat; they would eat 1,330,425,000 grains. If 8000 grains fill a pint measure, there would be $166,303\frac{1}{8}$ pints of grain, or about 65 loads. I leave it to others to estimate what this is worth, as I think I have carried the calculation far enough to show that it is altogether to the detriment of farmers and agriculturists to destroy hawks. In other manners I have demonstrated how they are of value to keepers. Enlist the services of hawks and they will reap benefit everywhere.

One is often surprised when passing through plantations in our country rambles, at seeing a sparrow, or other similar bird fly past us, with great haste and precipitation, the while uttering piteous, plaintive cries. The astonishment, however, diminishes as we see a dark form glide quickly by and turn round the moss-grown rock past which the doomed bird flew. The dark form is the much dreaded sparrowhawk; and no doubt were we to extend our walk a short distance in the proper direction, we should disturb the sylvan tyrant enjoying its sanguinary meal with evident satisfaction.

The female is a stronger, larger, and more courageous bird than her mate, and such birds as thrushes (Merulidæ) and even larger birds, as lapwings and pigeons—find in her a very powerful foe. She will not hesitate in attacking a plover and will bear it off in her talons. The derivation of its local name of "Pigeonhawk" needs no explanation. She is also a swifter bird than the male, and may be seen at one moment flying along a hedgerow, or by the edge of a grove of trees, while immediately after we see her darting madly through the woods, quickly threading the labyrinth of branches in quick chase after her frightened prey, which, however, seldom escapes, so deftly are the numerous twistings and turnings executed. I have ofttimes wondered how this bird could proceed at such a tremendous speed. In its passage it makes a loud disturbance in the air, as of a loud wind, and is lost to view behind the screen of some outjutting rock, or is hid by a clump of dark green foliage.

The sparrowhawk loves to feed off a fine plump chicken, and will venture much to procure one. If a farmyard be situate in the vicinity of its site of nidification, it does not scruple to pay its visits at intervals—particularly in the grey dawn of morn, or in the growing dusk of evening. It dashes over the intervening hedge, sails across the yard on outspread pinions, snatches up one of the heaviest chickens, glides stealthily round the barn, and darts across the adjacent meadows, away to some sequestered nook in the woods, there at leisure to eat its stolen morsel. The goodwife, on coming out to see the cause of all the noisy cackling occasioned by the recent visit, only sees the old white hen, clucking vociferously and collecting all her young fry around her. If not checked in the habit, the sparrowhawk will soon learn to repeat its visits, until at last it has robbed the yard of all its chickens.

An old, grey-headed keeper recounted to me a wonderful instance of this bird's daring. He was feeding some young partridges, and his hat was actually swept off his head by some passing object, at the same time he heard a noise as of a body passing rapidly through the air. The next thing he saw was one of the young birds he was attending, being borne off by an audacious female sparrowhawk. The partridges were at the time not two yards distant from him.

I have known a bird of this species attack a hen sitting on eggs under a hedge, and to pluck a quantity of feathers out of its tail and back.

Like other European birds of prey, this bird has a representative in Australia, the collared sparrowhawk (*Accipiter torquatus*). We read that this bird is similar in most respects to our own. Gould says it "has all the characteristics of its European ally." In North America it is represented by the American sparrowhawk (*Falco sparverius*, Wils.) which, according to Wilson, appears to possess all the inherent wild courage and audacious manner of our own bird.

(*To be continued.*)

ON PALÆOCORYNE, AND THE DEVELOPMENT OF FENESTELLA.

[*Concluded from p.* 229.]

By George Robert Vine.

I COME now to what are called the spiniferous processes of Fenestella, the most peculiar of the whole group. Several figures of species of these are given by the Messrs. Young in their paper on Palæocoryne, Vol. 30 of the "Quarterly Journal of the Geological Society;" some are *in situ*, others are detached. The Messrs. Young give figures of different species of Fenestella, with the spiniferous prolongations attached, and they also give figures of specimens found in the shales of Hairmyres and elsewhere in detached fragments. Dr. Duncan does not take these processes into consideration in his papers on Palæocoryne, and in the discussion which followed the reading of Messrs. Young's paper both Dr. Duncan and Mr. Jenkins failed to comprehend

the value, or even the bearing of the illustrations furnished by the authors. I have said before that the processes—fertile or sterile—Palæocorynæ, are unique in character and type, and it is only folly to seek for similar processes in any of the modern species of Polyzoa.

In these papers I have endeavoured to give illustrations only of specimens of polyzonal processes from my own cabinet, or from specimens that have actually passed through my hands; but as I have been supplied with sketches of processes from the cabinets of others, I could not resist the temptation

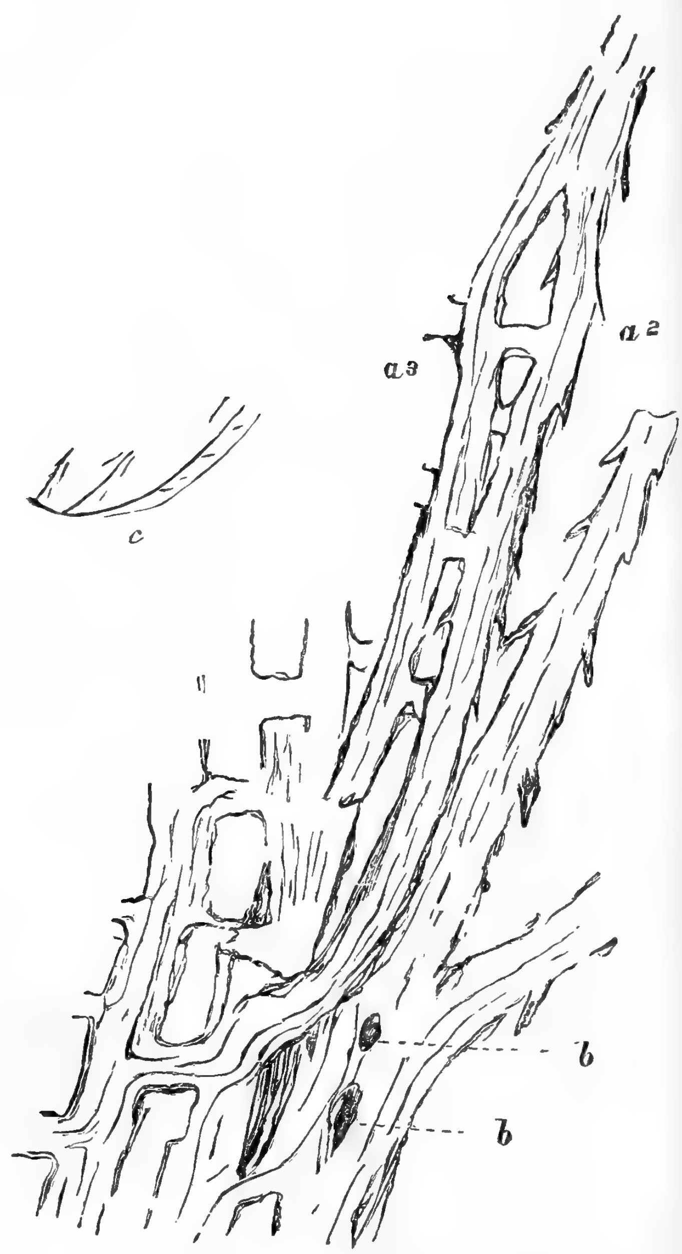


Fig. 181.—Spiniferous processes of *Fenestella plebeia* (M'Coy) Halkyn, North Wales; a^1. Basal origin of spine a^2; a^3. Fenestrules of the polyzoary; *bb*. Imperfect fenestrules; *c*. The way the spines rose up in the undisturbed shale.

of reproducing some, kindly furnished by Mr. John Young. Fig. 46 (SCIENCE-GOSSIP, March 1879), is a sketch of a branching spiniferous process *in situ*, on a frond of Fenestella from Cragenglen Campsie. It is four times the natural size, and it is one of the most beautiful processes from the poriferous face that I have ever seen. In Mr. Shrubsole's collection there is another fine specimen of spiniferous process springing from the back of the frond, altogether different from the one here figured. The specimen from which fig. 181 is given, is a perfect study of this particular process. It is from the Halkyn series of Fenestella, and the drawing is made from a section of the shale only partially rendered transparent. The figure represents the outer portion of the frond of *F. plebeia*, and the spiniferous processes are unlike any of those given by the Messrs. Young. The branch (a) originates in the dissepiment marked a^1 in the fig. 181. It passes on then to a dissepiment higher up, then into another, until it reaches the outer branch, the continuation of which is spiniferous until it reaches the extremity shown in my section. Mark the character of this branch. There are regular dissepiments part of the way up until at last the two branches coalesce, and continue then, apparently, as one solid spine. The two lower spiniferous branches

Fig. 182.

Fig. 183.

Fig. 184.

Spiniferous processes.

Fig. 185.—*Palæocoryne radiata.*

are of a different character to the others. I have given all that my section now shows. Before I rubbed it down these branches were prolonged considerably, not on the same plane as the part that is shown in the fig. 181, but they penetrated through the shale something like what is shown at (c), and they bent from the poriferous face upwards. At (*bb*) two partially developed fenestrules are shown. I cannot trace any remains of zoœcia in these branches and there is no hollowness. The character is that of a solid spiniferous shoot. The figs. 182 and 183 are from specimens from Richmond, and fig. 184 is enlarged to show the special character of the hook.

There is a specific value belonging to these spines, which in all future diagnoses of species will have to

be considered. In *F. plebeia* the recurved spines have double characters, one thickly, and the other sparsely set. In some doubtful species of Fenestella, both in Scotland and in Hurst, the recurved spines are strongly fluted. In *F. membranacea* the fluting is finely beaded, and in *F. nodulosa* the spine is distinctly characteristic. I have used the typical character of the spine as given by the Messrs. Young most effectually in my investigations, and although in some parts these may vary, the differences are perceptible when closely examined.

It may now be asked, since there is no analogy to guide us, what were the purposes the processes (Palæcorynæ and spiniferous) were intended to serve? The answer is not an easy one. I have attempted in my essay to unfold a mystery, but as this part of my writing has created opposition from several able specialists to whose decision I for the present bow, I withhold my speculations till others, abler than myself, will take the hint now furnished, and give a more philosophic view than it lies in my power to do. The conclusions I arrived at will have to be faced by specialists, and no one will be more pleased than myself, if my views are proved to be crude or erroneous.

I now leave the question as to the mode of development of the whole of the Fenestrate Polyzoa of the Palæozoic era to the unprejudiced judgment of the palæontologist. When I began the study, I never thought that the investigation would have taken me into so many of the by-ways of life; but, bit by bit, the great mystery which had hitherto enveloped these forms began to unfold itself, and for months past my mind and thoughts have been occupied, and my leisure time devoted to an endeavour to comprehend the secret of this particular life.

Many of my specimens I have been obliged to prepare in a very novel way. In reducing to transparency many of these sections of shale, I came across peculiar aspects of the spines and Palæocorynæ, these I had to draw before I reduced the section further; so, bit by bit, I was able to piece in as it were the whole idea of the spine. Then this would follow the fate of the other views, and so on, till I could trace right into the heart of the branches and dissepiments, the ramifications of the spiniferous process. This was the case with fig. 181, but I have faithfully followed the processes and the Palæocorynæ, neither putting down less nor more than what I saw. Every figure therefore is true to nature, and if they be not so artistic as I could wish, they have in their unartistic roughness all the truth as it appeared to me.

Note.—I shall be happy to communicate with any students of the palæozoic polyzoa who desire exchanges for study, and I should also be glad to examine any Fenestella they may entrust to me if sent direct by post.

Attercliffe, Sheffield.

NOTES ON A CURIOUS MITE (*CALYPTOSTOMA HARDYI*).

THIS very curious mite was found by Mr. Hardy in the Cheviot Hills, and described and figured by Mr. Cambridge in the "Annals of Natural History" for 1875. The description is minute, and very good, excepting where he says that the upper surface is "*very convex*." As his specimens were not

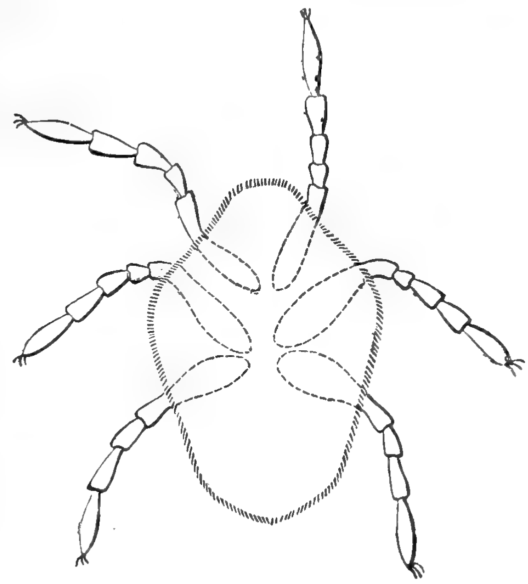


Fig. 186.—Outline of nymph of Calyptostoma.

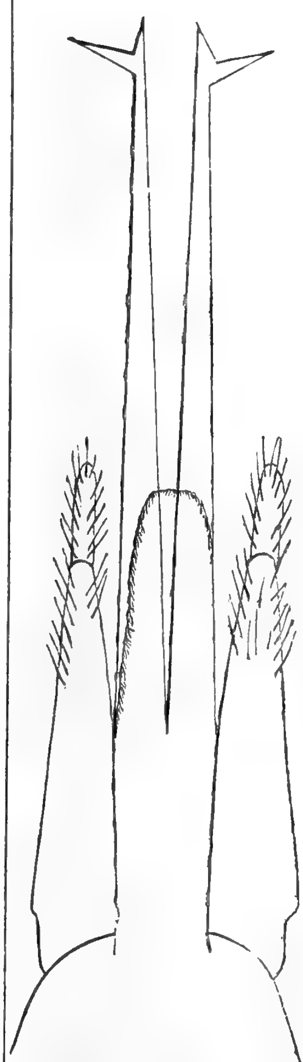


Fig. 188.—Mouth parts fully protruded.

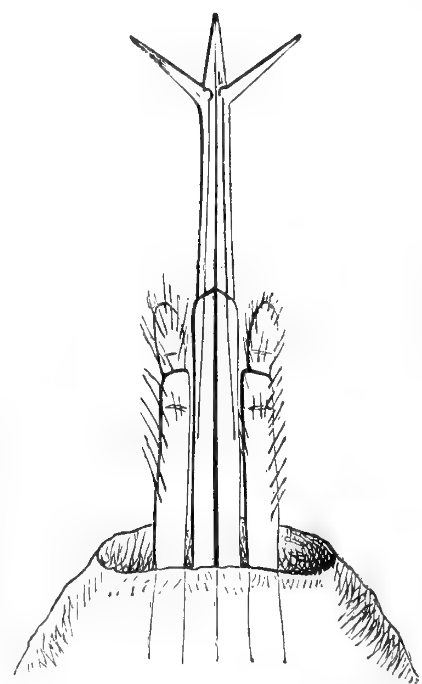


Fig. 187.—Mouth parts of Calyptostoma, partly protruded.

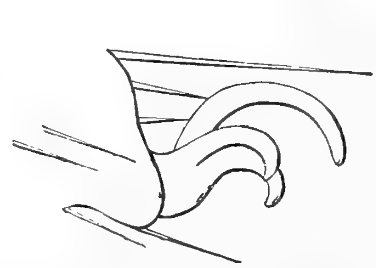


Fig. 189.—Tridactyle tarsus of nymph (highly magnified).

living ones, I attribute this convexity to endosmose, due to the preservative solution in which they were probably kept. During the present year I have found three or four living specimens, and all these were rather flat and wrinkled, just like *Trombidium holosericeum*. Mr. Cambridge says that the "mouth parts are apparently very minute, and concealed in a deepish circular cavity at the extremity of the forepart." He also says that the structure could not be ascertained by the magnifying power at his disposal. I therefore thought that it would be acceptable to some of your readers to have a sketch of these mouth parts, which are indeed very remarkable, beautiful, and entirely different from any other mite, whose mouth I have had the opportunity to examine. At first sight the creature appears to have no mouth organs; there is, however, on the under side of the forepart, a pit, or depression, and when the mite is placed in a compressorium, and graduated compression applied, the proboscis emerges by degrees. Fig. 187 is a drawing of these parts when partially protruded; and fig. 188 the same after sufficient pressure has been applied, not only to completely evert the organs, but also to separate the component parts; the figures are sufficiently clear without description. I found the mites whilst searching for beetle-mites amongst moss, and rubbish taken from the decaying roots of trees in a fir plantation.

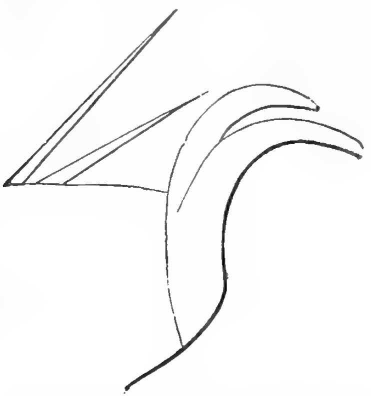


Fig. 190.—Didactyle tarsus of mature mite (highly magnified).

In March 1878, I found what I now believe to be the nymph of this creature; it has six legs, and each tarsus is supplied with three claws, the central one being much larger than the other two. When I first found it, I took it to be the nymph of a Trombidium, and did not examine it sufficiently whilst it was alive. It is a very curious circumstance that these mites should have tridactyle tarsi when in the nymph stage, and didactyle ones when fully developed; whereas, in many of the beetle mites, the nymphs have but a single claw, and the perfect creature possesses three. I send an outline sketch of the nymph, from one of my mounts; also the claws of nymph and perfect mite, highly but equally magnified.

Kirton Lindsey. C. F. GEORGE.

COSSUS LIGNIPERDA AND LITHOSIA QUADRA.—I took two cossus at sugar here on the 9th of August last, and one rather battered female quadra, while flying round a lamp-post, on the 14th of same month. The latter is, I believe, generally considered a New Forest species.—*J. R. Edwards, Streatham.*

ON THE SCIENTIFIC VALUE OF MICROSCOPIC PREPARATIONS.

THE following remarks in a letter of Dr. Pelletan ("Journal de Micrographie," 3e année, No. 3, p. 139) on microscopic preparations will be appreciated by those who use the microscope as an instrument of scientific research rather than a superior kind of toy requiring the aid of pretty objects to make it interesting; and it may moreover console those who have neither the leisure nor the manipulative skill to arrange diatoms, butterfly scales, sponge spicules, &c., in elegant patterns. The selection of Diatoms, Polycystins or Foraminifera, when very scarce in a gathering is perhaps desirable, and the preparer may always learn more of the structure and contour of the objects by selecting and transferring them to a clean slide than by merely mounting them with the extraneous matter contained in the gathering, but there is no advantage in arranging them in elaborate patterns. We will now hear what Dr. Pelletan says about them.

"You complain, in your letter, of the little scientific value of the majority of microscopic objects prepared for sale, and you have good reason for doing so. With the exception of a few these preparations are insignificant. They are often very beautiful in appearance, mounted on the choicest glass in an irreproachable cell, with varnishes of all colours, the labels of every shade, and are very elegant to look at; but the object they contain is worthless. The preparations of diatoms are alone, for the most part, satisfactory, often excellent, and sometimes marvellous. All the world is acquainted with the preparations of diatoms of E. Wheeler, A. C. Cole & Son, and above all of J. D. Möller, whose 'Typenplatte' is a veritable *chef-d'œuvre* of patience and manipulation. Certain preparations of cryptogamic botany are also of some value, as sections, dissections, &c., of vegetable anatomy, thin cuttings of dense substances, animal, vegetable, and mineral, and particularly sections of wood are all very instructive, but of all other classes of preparations whose nomenclature fills the catalogue, it is only by chance one meets with an interesting slide.

"From what you have said I perceive that you are occupied with microscopic anatomy, and more especially that of insects. But histological preparations, whether normal or pathological, whether of man and other vertebrates, or of the invertebrates, are precisely those of the least value.

"Of the Arthropoda, among others, the preparers limit themselves to amputated feet, heads, antennæ, tongues, stings, &c., mounted in balsam, and behold the result. Others, more ingenious, mount large insects or immense spiders entire, after having emptied them of their contents, and these preparations have really a magnificent appearance. But, alas! the integument is all that has been preserved, and the little that remains of the internal organs is

represented by a uniform transparent mass in which the microscopist finds nothing to study, and in all the smaller kinds of insects they are also in a more or less transparent condition containing more or less opaque masses, covered with a well-preserved integument and to this state they are reduced by the preserver.

"In England we sometimes find preparations that are mounted without pressure; in these the insect is placed in the middle of a thick mass of balsam after having been impregnated with some essential oil to render them transparent, and not being pressed they are not deformed.

"Some of these preparations are very successful, particularly those of spiders; we can also perceive the remains of the internal organs, the muscular system, for example. I have also made a good many of them, but although they possess some advantages, their thickness (sometimes several millimetres) prevents their being studied with objectives of a short focus.

"I would not say that all preparations which I call trivial are useless: most certainly not. If they are not satisfactory to *savants*, they interest *amateurs*, and they teach many things that otherwise would not have been known. They are also useful in England, where they are sold in large numbers, because among our neighbours the microscope is more used for amusement and as an object of luxury than for working purposes.

"The young 'misses' in the drawing-room are better amused with, and, I believe, more usefully employed, in admiring the delicate little comb that forms the claw of a spider's foot, or the elegant little scales that enamel the wing of a butterfly, than in examining the insipid portraits in a keepsake.

"These slides, that for us have little interest, are therefore in this point of view of real utility. They give to ordinary people the taste for natural objects, and they furnish a thousand little instructions acquired without labour, and are also amusing. We must, therefore, not too much despise them.

"How is it that preparations of diatoms are always satisfactory? Primarily, because they are in reality the most easy to make. The diatoms relatively require but little manipulation to prepare them for mounting, and in consequence of their beauty the study of these little organisms has largely increased. The preparers are, therefore, all more or less, diatomists; they know what to do, they know how the object ought to be mounted. Certain vegetable organs are also well displayed, as there the preparer also knows how best to mount them as trachea, stomata, ovules, spores, organs of fructification, &c. But when they attempt animal anatomy, whether that of the vertebrates or invertebrates, whether normal or pathological histology, the preparers, with very rare exceptions, have not sufficient knowledge to know what is necessary to make visible, what is the characteristic detail he should render evident in order to make the preparation instructive. They imagine it to be sufficient to take a piece of tissue, injected or otherwise, harden it, make longitudinal and transverse sections, then steep it in carmine, mount it in a beautiful cell, and by these means obtain a slide useful for something. This is a grave error. For example, I have before me various "commercial" histological preparations, disassociated muscular fibre, a torn nerve filament, a slice of conjunctive tissue, the nerve terminations on a muscular fibre. What do I learn? The muscular fibres have not been stretched. I do not see sarcolemna made evident, nor the nodes, nor the least detail of the striæ, discs, and transparent spaces.

"The nerve filament shows me some little clotted threads scattered in the midst of a small cloud of conjunctive tissue, but of the myaline sheath, the cylindrical axis, the annular constrictions of the nodule of the segments of the endothelial cells (I do not speak of sections) I see nothing of all these.

"In the connective tissue I look in vain for a distinct element, the connecting fascia, and the elastic fibres, all is confusion, and the conjunctive cells are absent. In the nerve terminations on muscular fibre, I see a small yellow patch on the fibre; this is the motor plate, but the sheath, the ramifications, the nodules of various kinds, are all invisible.

"You will tell me that of all specimens, histological are the most difficult and tedious to prepare, and that it is generally impossible to show all these details in one preparation. This is true, but it is only a secondary reason. These difficulties are overcome by the facility given by practice.

"If one wishes to see all the details of structure in any particular organ, it is necessary to make many preparations. Alas! as I before remarked, preparers, with very few exceptions, have not sufficient histological knowledge, and are ignorant of the necessary technical methods, or even the will, because they are tedious and delicate, and they moreover fear that the increased cost of these preparations would frighten those who might wish to acquire them. I believe there is no foundation for this last reason, and I judge from the daily demands for preparations made on these principles, even at an increased cost, when they are really instructive, and I cannot doubt it when I see the most common specimens of *Pediculus pubis*, sold in America for 5 fr. 75 c., in which country it is not rarer than in France."

ECHIUM VULGARE is not so uncommon in our neighbourhood as your correspondent T. Comlidge supposes. It grows in large masses on the beach between Portslade and Cliftonville, on the road from Bramber to Shoreham, and many other spots, but it does not generally make its appearance on the Downs, except in basin-shaped holes, where it sometimes attains considerable dimensions.—*Benjamin Lomax.*

THE HISTORY OF *RANATRA LINEARIS.*

On the excursion of the Hackney Microscopical and Natural History Society, held June 28, I captured a pair of that interesting aquatic insect the *Ranatra linearis*, and having since had the good fortune to breed from them, I venture to submit to you the following short observations. To watch these insects feed, and their mode of taking their food, I placed them in an upright glass aquarium with plants of *Vallisneria spiralis* and common frog-bit—this was on June 28. On July 7, I was much surprised to find the leaf of frog-bit exhibiting a most unusual appearance—as shown in fig. 191. The

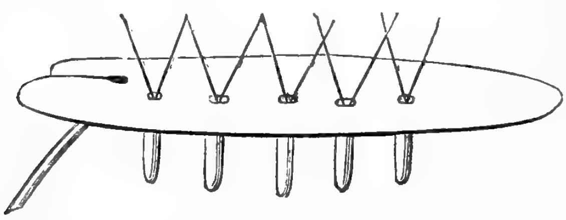


Fig. 191.—Eggs deposited on leaf of Frog-bit.

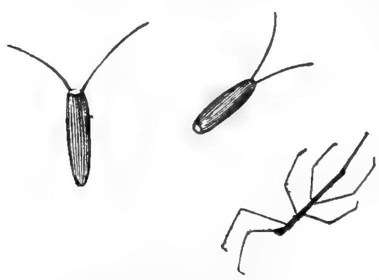


Fig. 192.—Single eggs and young of Ranatra.

best verbal description I can give of this appearance is, that the floating leaf appeared on the top to possess the antennæ of some moth, to which underneath was attached a small substance, something in shape like a canary-seed, but more rounded at the extremities, especially at the end from which these antennæ or appanages sprung. The leaf had evidently been pierced, the appanages thrust through when they opening into a V-like shape, kept the underneath substance from falling. I was much puzzled by these appearances, and being quite ignorant of what they were, called in one or two friends to see them, in the hope of acquiring information; but being unable to get any I the more anxiously watched and almost came to the conclusion that they were the germs of some botanical production. The leaf of the frog-bit from some cause or other decaying they gradually sank, the same V-like appanage which had kept them in their position now keeping them from falling too fast or from sinking in the soft mud at the bottom of the aquarium; here they remained in a perpendicular position and were watched from time to time. On August 4, I was delighted to find four young Ranatra swimming freely about (see fig. 192). They were about half an inch in length, and in form so like the parents it was impossible to be deceived. On the 5th another was added to the number, which the elder ones instantly devoured while it was yet in a helpless condition. I should think the first must have been hatched on August 3, although I did not see them until the 4th, they were so strong and well-grown when first observed, whereas the fifth, which must have been seen directly after its development, was a poor little pink thing with large black eyes, and soon became a prey to those of yesterday. The appearance of these young Ranatra led to the discovery that the objects on leaf of the frog-bit which had so puzzled me were the ova of this insect, for I found them all on the bottom of the aquarium quite empty, with an opening in the end between the antennæ or appanages, so I come to the conclusion that when I took

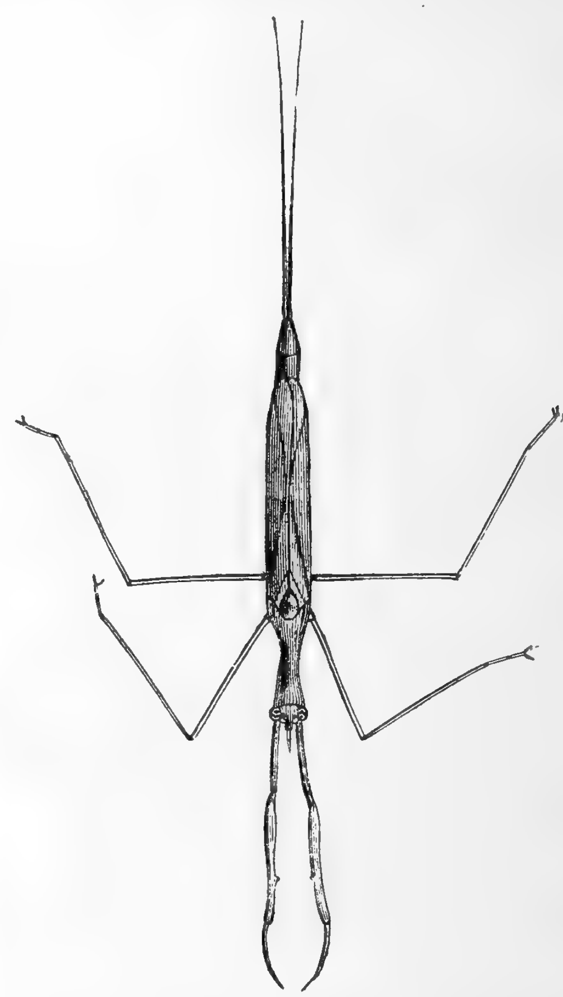


Fig. 193.—Full-grown Ranatra (natural size).

the adult Ranatra on June 28, they were in copulation, that the ova were deposited on July 6 or 7, and the puny insect developed on August 4 and 5. These times may of course vary according to circumstances, I only speak from personal observation. I cannot help thinking what an interesting sight it must have been to have watched the insect depositing the ova, how the leaf must have been pierced, the ova extruded, the antennæ—if they may be so called—being thrust through the perforated opening, on which they must have immediately sprung into a wedge-like shape—opening wide at the top—to keep the ova in position. How long it takes the young insect to acquire maturity I cannot say, probably some twelve months; unfortunately all mine perished, the greater part being devoured by their brethren,

the remainder I am afraid from lack of proper food. When first hatched the young ones are perfect, with the exception of the ova depositor which is not fully developed, when this is acquired is a subject for further investigation. The full-grown insect, as shown in fig. 193, is some three and a half inches in extreme length, it is furnished with four legs and two front feelers; these cannot be called legs, for they seem to be used for no other purpose than catching the prey; they are furnished with two hard horny joints at the end, with which they seize their food (see fig. 194); in this respect nothing seems to come amiss, the young ones I have seen as well as the old, feeding on various daphnia, cyclops, &c. I am sorry to say they devoured all my *Actinophrys sol*, bred in the same

Fig. 194.—*Ranatra linearis* in the act of catching insects.

aquarium, while one of the old ones seized and destroyed a full-grown tadpole of the frog; they will really devour anything. As my readers are well aware, the Ranatra belongs to the Nepidæ, and is closely allied to the water-scorpion. It appears, like that insect, to have wings, but from fear of hurting my specimens, I have not been able clearly to make this out, and shall be glad of any information; if so they are very hard to unfold and can be but little used. It feeds on suction—the prey being seized by the strong claspers, attached to the front feelers or legs, and drawn up close for the horny and beak-like proboscis to be thrust into it, with which the life of the victim is sucked away. When handled, the insect often feigns death; when it crawls, as before observed, the four legs are only used, although I have seen the front feelers thrown round a plant or stem to assist as it were the progress. These feelers or legs consist of two joints, the first can only be moved upward (see fig. 194) the second joint can only be moved downward and is often folded directly under the second joint, so much so that there then appear only two joints—the whole is capable of being thrown out in quite a horizontal position, as fig. 193. So in this front leg or feeler we have two joints, each with quite a separate action, but both moving in unison to the desired object. I hope these few remarks, made from personal observation, will be the means of exciting further research into the life-history of this extremely interesting insect, relative to which I shall be glad to receive any information.

COLLIS WILMOTT.

THE HISTORY OF THE APPLE-TREE.

By H. G. GLASSPOOLE.

[*Continued from p.* 223.]

THE varieties of apples are so many, and several have interesting histories attached to them, that it would be impossible within the limits of this paper to give an account of them. I will only mention one or two of our most well-known kinds. The earliest apple that ripens in our country is the jounneting, or gennetting, a small, pale yellow, sweet tasting fruit; it is a very old variety, and is mentioned by Evelyn in 1660, and described by Ray, 1688. There are various opinions as to the etymology of the name. Dr. Johnson has written it gineting; while some country people and the Americans call them juneating apples. In the old Latin writings they are termed joannina, no doubt from their becoming ripe about St. John's Day (June 24th). One of our best eating apples is the ribstone pippin, which an American writer says stands as high in Britain as the Bank of England, and to say that an apple has a ribstone flavour is there the highest praise that can be bestowed upon it. (A. J. Downing's "Fruit and Fruit Trees of America.")

The original tree sprang from some apple-pips brought from Normandy at the close of the seventeenth century; they were sown at Ribstone in Yorkshire, five of the pips grew, two producing crabs, the other apples, one of which was the famous pippin. The original tree is supposed to have been planted in 1688 and stood till 1810, when it was blown down, but being supported by stakes in a horizontal position, continued to produce fruit until 1835, when it lingered and died. This apple was some years before it attained its popularity, for at the end of the last century it was little known, as is shown by the fact that in 1785, and for some years afterwards, no more than twenty-five plants per annum of this tree were grown at the celebrated Brompton Park Nursery, whereas, in 1851, about 2500 plants were annually sent out thence (see Mrs. Burnand's

Common Fruits). It is generally to be met with in almost every large orchard in the kingdom. Norfolk has long been famous for apples; some account of the best varieties peculiar to or cultivated in that county by Mr. Lindley, will be found in the Horticultural Transactions, vol. iv. p. 65. The Norfolk Beaufin, or Beefin, Lindley tells us, is undoubtedly a Norfolk apple. Independently of its general use in the kitchen, it furnishes a luxury for the table as a sweetmeat; great numbers used to be prepared at Norwich by drying them slowly in baker's ovens after the bread had been drawn, and pressing them with the hand to flatten them till they are perfectly soft and are of a deep, rich brown colour; they were then packed in boxes and sent to London and other parts of the kingdom, where they were considered a great delicacy. The Horsham russet is another Norfolk apple, and raised from the pip of a Nonpareil by a Mrs. Goose, of Horsham, St. Faith's, Norwich, many years ago. The apple, as an article of food, is probably unsurpassed for its agreeable and nutritive properties. Our forefathers believed the fruit to be something more than to fill an empty stomach; they also commended it in "splenatick" and melancholy disorders. John Key, better known as John Caius, the Court physician to Mary and Elizabeth, had a high opinion of the fragrance of apples in a sick-room, for he recommends them in one of his works to patients recovering from a "sweatynge sickness," if they found their strength wasted, "for," adds the doctor, "there is nothing more comfortable to the spirits than good sweet odours." Another old English writer of 1657 tells us that those pleasanter kinds of pippins and pearmanes being roasted and eaten with rose-water and sugar, are helpful to dissolve melancholy humours, and to expel heaviness and promote mirth.

Pomatum owes its name to apples. In a work called "Secreti d'Alessio Piemontees," by W. Ruscelli, an Italian, published in the sixteenth century, there are several formulæ for making pomatum, in which pippins form the principal ingredient. Gerard, in his herbal, states that the pomatum in his time was composed of the pulp of apples beat up with swine-grease (lard), and rose-water. The wassail cup our forefathers used to indulge in on All Hallow eve, and the eves of church festivals, called lambswool, was composed of apples toasted on a string until they dropped into a bowl of hot spiced ale, placed ready to receive them, and they gave great softness to the beverage. Lambswool is thus etymologised by Vallancey. "The first day of November was dedicated to the angel presiding over fruits, seeds, &c., and was therefore named La Mas Ubhal, that is the day of apple fruits, and being pronounced lamasvel, the English have corrupted the name to lambswool." The various ways in which apples are cooked is well known. "A Hundred ways of Cooking Apples" was one of the cheap popular books one used to see on the bookstalls not many years ago. Perhaps the most staple form in which it appears in this land of solids is the apple dumpling. Coleridge said that no man has lost all simplicity of character who retains his fondness for apple dumplings; let us hope this doctrine is still true, for in some countries an apple dumpling with a piece of bacon or pickled pork in it, forms the staple of the mid-day and evening meal of the agricultural labourer. It is said that King George III. was once greatly puzzled to know how the apple got into the dumpling. Most of the old-fashioned farm and manor houses in this country possess large orchards, which contain more of these fruit trees than any other. Dr. Johnson gave the following advice to one of his friends. "If possible," said he, "have a good orchard. I know a clergyman of small income who brought up a family very respectably, whom he chiefly fed on apple dumplings."

Hogg remarks, in his work on apples, that it has existed as an indigenous tree throughout all ages, and that the most ancient varieties were accidental variations of the original species with which the forests abound. In its wild and uncultivated state, the apple is known in this country as the crab; by some authors it has been supposed that the garden apple is not an improved crab, but rather the crab is a degenerate apple, and that it has an Eastern origin (See Prior's "Popular Names of British Plants"). As to the Eastern origin of this tree, Professor Koch spent much time between 1836 and 1844 in Armenia and the adjacent countries investigating the subject, and the results of his studies and inquiries led him to believe that the apple never grew wild anywhere south of the Caucasus. The celebrated traveller Van Buck, remarks that the apple will grow in the open air wherever the oak thrives, thus it is found as far north as lat. 60° in western Russia. The crab of Europe is wanting in Siberia, but the Siberian form of the species is widely distributed over the country.

The people of Lapland showed Linnæus what they called an apple-tree, which they said bore no fruit because it had been cursed by a beggar woman to whom the owner of the tree had refused some of its produce. The naturalist found that it was the common elm, a tree also rare in that severe climate. The apple is stated by Royle to be cultivated in the southern parts of India, also in the Himalayas, and in China and Japan, but it is not indigenous to the warmer parts of these countries. As an instance of the difficulties attendant on the introduction of European plants into the north of India in former days, it is stated by Mr. Royle, that an apple-tree from Liverpool, in consequence of being the only one that survived, cost upwards of £70 before it was planted in the nursery at Mossuree. Apple-trees were introduced into America by the early settlers, and were first planted on an island in Boston Harbour, which still bears the name of Apple Island. The Indian tribes helped to spread this fruit through the country, and nowhere does it flourish better than in the land of

its adoption, the United States, from which large quantities packed in barrels and preserved in tins are sent to England every year. Some years so plentiful is the crop in many parts, that it has become a practice to employ the surplus of sweet apples in fattening pigs, &c. Perhaps one of the most delicious of the dessert apples which stands at the head of the list of American-grown fruit is the Newtown pippin, and which certainly fetches a higher value in Covent Garden market than any other kind. One of the finest orchards in the New World on the banks of the Hudson contains more than 2000 of these trees. The Siberian crab apple was not cultivated in Britain until 1758, and the small fruited variety was introduced in 1784; this tree is often planted as an ornament in our shrubberies.

(*To be continued.*)

MICROSCOPY.

How to Remove Air-Bubbles.—Air-bubbles, whether in balsam, glycerine jelly, or fluid mounts, are a constant source of annoyance to the amateur mounter. I will endeavour to show how these pests can be avoided. Firstly, with respect to balsam. Mr. Stokes, some months since, gave a plan which will answer in very many instances; but there are objects which will not stand the boiling recommended by Mr. Stokes, in such case the air can be got rid of by immersing the object in boiled water still lukewarm, and changing the water every two or three hours until the air is wholly displaced (boiled water absorbs air most greedily). The object is then transferred from the water into alcohol, absolute alcohol and oil of cloves in succession, allowing it to remain a sufficient time in each to displace the water or other fluid; the object can be mounted in balsam direct from the oil of cloves. The difficulty with glycerine jelly is that it begins to thicken immediately it is put on a cold slide, and when the cover is put on, air-bubbles are almost sure to be enclosed. The way to obviate this difficulty is to have the glass slip lying upon something heated to 150° or thereabouts, such as a hot-water plate or block of iron taken out of an oven; by these means the jelly is kept fluid whilst the object is being mounted; the cover must be breathed upon on its under surface previously to being lowered in its place; as soon as this is done the slide can be removed from the heated plate or iron, and the jelly allowed to set. It merely requires ordinary dexterity to mount an object in fluid in accordance with instructions given in works on this subject, but it certainly is an annoyance to an amateur mounter to find bubbles making their appearance when he knows that none were to be seen when the object was first mounted, and that the cement was good and reliable and properly applied. The question naturally arises, where do the air-bubbles come from? I have seen this attempted to be accounted for in several ways, but not to my satisfaction. The true explanation is that the preservative fluid itself contains "free" air; expel the air before using the fluid, and no bubbles will afterwards make their appearance providing the other part of the mounting be properly carried out. To expel the air from the preservative fluid, all that is necessary is first to fill the cell well with fluid and to place the slip upon a hot-water plate or heated iron; minute bubbles will shortly appear and can be detached from the bottom and sides of the cell by means of a bristle; they will collect at the top of the fluid and can be removed by just touching it with a little blotting paper; the slide must then be taken off the heated surface, the object immersed in the fluid and the cover put on and fastened in the ordinary way. If all be done properly no bubbles will afterwards be seen; on the contrary, I have at times actually enclosed a little air by accident when putting on the cover, which air has afterwards been absorbed by the fluid.—*H. M.*

Staining Fluids for Vegetable Tissues.—For some time past I have thought it rather "hard lines" upon the microscopical botanists that but one staining fluid has been used at a time. I have, therefore, tried several experiments with different fluids, and I am glad to say I have at last found out a most successful method of staining one section with two fluids. The way I now stain all my sections preparatory to mounting them is this: the section is first immersed in an aqueous solution of Crawshaw's aniline blue dye (strength, 1 per cent.). It is then removed into strong acetic acid, which seems to fix the colour in certain tissues, remove it from others and prepare that not stained for the reception of another colouring fluid. It is then again removed and put into a weak solution of magenta (Judson's dye), also made strong with acetic acid; then mounted in glycerine jelly. I find this such a beautiful and instructive method of staining (as it completely shows the "differentiation" of parts, both by the different colours and also the various intensity of colour) that I venture to ask room in your paper for its insertion, in order that others may be made acquainted with a system so simple, yet, which has cost me much trouble and many failures. The following are the colours with which the tissues of a section of Burdock are stained:—

Pith	Very pale magenta.
Cellular tissue	Deep magenta.
Spiral vessels of medullary sheath	Deep blue.
Pitted vessels	Blue.
Cambium	Deep blue.
Liber cells	Dark magenta.
Latiferous vessels	Deep blue.
Cuticle parenchyma	Pale blue.
Epidermis	Deep blue.
Hairs	Pale magenta.

—*Albert Henry Barrett.*

How to Restore Microphotographs.—In reply to Mr. H. Heasman's inquiry I beg to inform

him nothing is easier. They are mounted in balsam. All he has to do is to heat the slide on both plates just sufficiently to remove the covering glass. If by chance the photograph comes up with it apply a little turpentine or benzole (I forget which I used) to free it; transfer to clean slide and remount in fluid balsam.—*Fred. H. Lang.*

New Rotifers, &c.—In addition to the two Entomostraca found at Olton, new to this country, a rotifer only recorded lately in America has been found there, and a *Peridinium* (*ceratium*), only found previously in salt water. I made a rich gathering recently of *Lacinularia socialis* and *Cristatella mucedo*, &c., and send you a specimen of the former.—*Thomas Bolton.*

Euglena viridis and its Bulbed Flagellum.—It may, perhaps, interest Mr. Robson, to learn that I have seen all the forms of Euglena sketched by Mr. Harkus in October issue of Science-Gossip, though I do not, of course, claim to be the first observer of the peculiarity of the bulbed flagellum. Neither do I claim to have settled the question of the metamorphosis of the Euglena. Nevertheless, it is a very singular coincidence, that two observers, altogether unknown to each other, should witness independently a precisely similar phenomenon; particularly so, if the suspicion at which I hinted in my letter of August last have no foundation in fact, and be erroneous. Ehrenberg studied the life history of *Hydatina senta* very fully; would not a reference to his work tend to throw some light on this point? From a circumstance I observed a few months ago, I am led to believe that the bulbed flagellum is not a necessary appendage to the Egleuna. On one occasion, whilst closely watching the contortive movements of a full-grown specimen, I was much surprised to see the little animal "bite off," if I may so term it, the flagellum, which immediately floated away. Its absence did not appear to cause the Euglena to suffer any inconvenience, for it still continued to disport itself with as much activity as previously. Mr. Robson mentions the absence of the bulb from the flagellum of No. 1 sketch of mine in the August number of Science-Gossip. I noticed the same omission, but suspecting it to be the result of the block having been damaged, I did not consider it of sufficient importance to need any remark from me in the September number correcting it, as I stated so plainly that *all* specimens which had come under my observation *possessed* the *bulbed* flagellum. If Mr. Robson has a few specimens of the Euglena gathered by him, and would send them to me I would willingly defray cost of postage; and as I expect shortly to be in the neighbourhood of Preston, I will endeavour to obtain and send to him a sample of Euglena, similar to those I originally examined; such exchange, if practicable, will serve either to establish the identity or dissimilarity of the two gatherings.—*F. J. George.*

Cleaning Old Slides.—The easiest way I find is to warm slide and push cover into sulphuric acid, then put slide into a strong solution of common washing soda and boil for an hour or so. All varnish or cement may then be scraped off with an old knife with ease. Then wash all traces of soda away in clean water.

Leptodora Hyalina.—It is with much pleasure that we put ourselves and our readers right on a matter of fact. Mr. H. E. Forrest (to whom we ascribed the honour of first finding Leptodora in England), with characteristic fairness, writes to us stating that it is not to himself, but to Mr. J. Levick, a member of the Birmingham Natural History and Microscopical Society, that the honour of its discovery is due.

ZOOLOGY.

The Iceland Falcon (*Falco islandicus*).—A fine young bird of this species in beautiful plumage was captured in the Queen's Park, Edinburgh, about the end of August last, under the following circumstances: While Mr. R. B. Gilroy was walking there with some friends, he saw some lads striking at an object in a furze bush, and, on approaching, found it to be a bird of prey; stepping forward, he, with the assistance of his friends, secured it. As the Queen's Park is largely taken advantage of as a pleasure resort, they were soon surrounded by a curious crowd conjecturing what kind of a bird it was. One thought it was a hawk, another knew it was a falcon, a third declared emphatically it was an eagle, while a fourth was equally certain it was a parrot. Mr. Gilroy now procured a cab and drove home with his captive, for which he soon extemporised a convenient cage. But the bird looked dull and would not eat, and Mr. Gilroy thought it must either be exhausted by a long flight, or seriously ill, as it made no attempt to fly when captured; accordingly he called in a doctor, who forthwith administered a dose of castor oil, which had a wonderful effect in reviving the drooping spirits of the bird. It soon began to eat greedily, and was so tame when I saw it twelve days after capture as to eat meat out of the hand. So far as I am aware, there is no record of this species having been previously captured or shot near Edinburgh.—*David Douglas, Leith.*

How to Preserve Larvæ.—Having seen in your journal an article on preserving larvæ, I thought a few hints as to the plan followed by myself might be of use. The larvæ are killed, and the intestines removed in the same manner as described in your paper, but, before killing, I keep the larvæ without food for a couple of days, as if operated upon whilst full of vegetable matter, it leaves a black stain just behind the head, which spoils the look of the larvæ. In

preserving the skins, I use a glass tube bent as shown, and drawn to a fine point, the upper side of the point being straight. The skins are held upon the tube by means of a fine steel spring, tied to the tube; they are then blown out with the breath and dried over the flame of a common paraffin lamp, care being taken to keep them distended with the breath whilst drying. The bend in the tube is to prevent any moisture from the mouth entering the skin; when

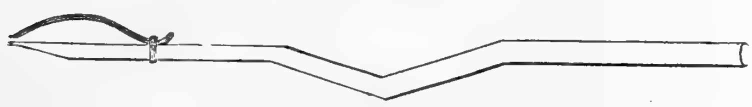


Fig. 195.—Tube for preserving Larvæ, length about 18 inches.

quite dry they are easily detached from the tube and mounted with gum upon stems of grass, or twigs. The hairy larvæ are soaked previous to drying in alum and water to keep the hair from falling off. To test when properly dried, the air has only to be exhausted from the tube, and the part of the skin not dry immediately doubles up. This is a simple method, and necessitates the use only of the one tube.—*T. W. Harris.*

URTICATING MOTHS.—It may not be generally known that the imagines of *Liparis auriflua* and *chrysorrhœa* possess the same urticating properties as the larvæ. One day last August I was conveying a gold-tail, which had just emerged in my breeding-cage, to the poison-bottle, and in doing so let it fall up my arm—between the flesh and my shirt-sleeve. It remained there but a second, as I immediately gave a shake and got it down again without any damage to the moth; but in less than ten minutes my arm looked as if stung with nettles, and the irritation, which was almost unbearable, continued for nearly two hours. About this time my brother, Mr. Arthur Anderson, of Salisbury, captured a gold-tail, which he carried home in his hat. Like myself, being unacquainted with the poisonous nature of the perfect insect, he was surprised to see his forehead covered with little bumps, causing an intolerable itching. So bad was it that he went to a medical man for advice, who told him he must have checked the perspiration, and accordingly gave him some medicine. Mentioning the circumstance one day to him of the moth falling up my sleeve, and the effects, he exclaimed, "Then that accounts for my forehead." In the summer of 1876 the hedges by the side of our canal were absolutely swarming with the larvæ of *Liparis chrysorrhœa*, and, strange to say, I experienced far greater discomfort *after* the moths had left the cocoons, as I could scarcely walk by the hedges without face, neck, and hands suffering severely, and I dared not beat them for moths for months afterwards. The reason of this may possibly be, that as the moths emerge the hairs which are so plentifully used in the construction of the cocoons are set free. Surely there must be some poisonous property in the hairs, the simple penetration of the skin could not cause such discomfort; and again, many hairy caterpillars, such as *Acronycta Aceris*, the *Arctia lubricipeda* and *Menthastri*, shed all their hairs, and with them line their cocoons, and yet may be handled with impunity. In the case of the imago I am inclined to believe that the irritation is caused by the *white* hairs which fringe the *inner* margins of the wings and not the golden tail-tufts, as I have rubbed the latter over my hands with no unpleasant results. I have bred specimens this year of *Liparis chrysorrhœa* with spots on the fore-wings much blacker than *auriflua*, more like *Arctia Menthastri*, the insects in each case being males. Newman says of *chrysorrhœa*, "all the wings white," and Stainton "satiny white, *spotless*, F. W., *rarely* with a black spot near the anal angle," so that I imagine the presence of spots is somewhat uncommon. The beautiful larva of *auriflua* is well known, that of *chrysorrhœa*, though very abundant where it does occur, is far more local; singular it is that caterpillars so dissimilar should produce imagines of such close resemblance.—*Joseph Anderson, jun., Chichester.*

A SUPERIOR MODE OF KILLING INSECTS.—Dr. J. M. Eder has communicated to the Zool. Botan. Verein at Vienna (Verhandl. 1878, Sitzungsb. p. 19), a mode of killing insects, especially Coleoptera, which he has used for many years, and finds superior to others, inasmuch as its action is more rapid, and the colour, hair, or scales of the insects are not affected by other agencies. All that is required is a wide-mouthed glass bottle, having a cork fitted tightly: into the bottle are put some pieces of stout blotting paper, and on these three or four drops of bisulphide of carbon (Schwefelkohlenstoff); of this supply sufficient for the service of a day or two may easily be carried in a small bottle in the waistcoat pocket. When an insect is put into the bottle and the cork quickly replaced, death ensues instantly, or in the case of the largest beetles, within a few seconds, and the bisulphide, by reason of its volatile nature, being immediately vaporised, the insect is dry, and its condition in no way injured. Occasionally, if the bottle be often opened, a drop or two of the bisulphide must be added, in any case it is essential that the cork be replaced directly and firmly. The bisulphide is also very effective in exterminating *Ptinus fur* and *Anthrenus*, and it is further recommended on account of its being cheap and easily obtained.

RED SEA-WEEDS AND ANIMALCULA.—In the October number of the "Zoologist" (now one of the liveliest and best edited of our scientific journals), there is a capital abstracted translation of a remarkable paper by Dr. Dodel-Port, entitled "The Fertilisation of Red Sea-weeds by Animalcula." This paper is an ingenious endeavour to show that the non-locomotive spores of such red sea-weeds as the Florideæ are

carried by currents much after the fashion that the pollen-grains are conveyed by the wind, and that such infusoria as Vorticella, by their attached positions on the sea-weeds, cause the spores to be deflected on to the female organs, and thus produce fertilisation. The theory opens up another remarkable chapter in the inter-relation of animals and plants, and shows that animalcula thus do for red sea-weeds, what insects perform for coloured and attractive flowers.

PARASITES ON HEDGEHOGS.—Hedgehogs are by no means exempt from these parasites and some forms of Acari—in addition to Ixodes ("X" of present No.)—may not unfrequently be taken from their bodies. Before me is one in my cabinet taken and prepared by my own hands a long time since, to add to my collection of animal parasites. The hedgehog had many, but I never observed signs of discomfort. At a cursory glance, *Pulex erinacei* might be accepted for *P. canis.* They differ, however, the specific characters of *erinacei* being—Head, naked. Mesothorax fringed. Tarsi, anterior, 5.2.1.3—4; posterior, 1.2.5.3—4. Considering the adaptability of means to ends, the peculiarities of the animal, and the uses of the flea in creation, I should consider it remarkably strange that the hedgehog should be deprived the benefit resulting from the habits of this parasite in its larval state, which I apprehend must far outweigh any inconvenience from the suctorial habit of its final condition, since hedgehogs are possibly less acutely sensitive of cuticular irritants, while pain and its effects seem modified by peculiarities of structure.—*J. Fedarb, B. C.*

RARE CETACEANS.—In my note under the above heading in SCIENCE-GOSSIP for October, p. 233, by some error "white-*beaked*" dolphin is printed "white-*scaled* dolphin."—*T. Southwell.*

"THE POPULAR SCIENCE REVIEW."—Among the leading articles which appear in the last number of this popular serial are the following:—"On Jade and Kindred Stones," by Prof. F. W. Rudler; "Report on American Dredgings in the Caribbean Sea," by A. Agassiz; "The most Powerful Telescope in Existence" by E. Neison; "Flight and its Imitation," by F. W. Breary, &c.

BOTANY.

THE COMMON STINKHORN (*Phallus impudicus*) AND ANTS.—During the months of July and August, I met with several specimens of this noisome fungus, and became quite expert in discovering their whereabouts by means of the peculiar fetid odour arising from them, which, if once smelt, will not readily be forgotten. One fine specimen, which measured seventeen inches from the base to the summit, had its cap almost denuded of the dark slimy mucus which covers it, and from which the powerful scent principally arises, by swarms of ants, which were busily engaged upon what appeared to be to them a dainty feast. The ant-hill was thrown up around the bottom part of the stalk of the fungus, up which a stream of eager little insects was continually climbing to share in the banquet above, which they evidently enjoyed. I have, on one or two occasions, seen the cap of the stinkhorn covered with various species of flies, but never before observed ants attracted by it. I may observe that the stinkhorn is far from common in this locality, but the damp summer appears to have been favourable to its growth, for I have met with more specimens this season than ever I did before.—*R. Standen, Goosnargh, Lancashire.*

GEUM RIVALE.—I was much interested on seeing the notice of a monstrous form of this plant in a recent number of SCIENCE-GOSSIP. Departures from the normal form seem to be plentiful this year. One I came across seems worthy of notice as being useful to students of morphology. The calyx consisted of five ternate divisions quite distinct, having exactly the appearance of stem leaves, only smaller; the corolla had ten petals instead of five, the stamens were rather less in number than usual, and all perfect, carpophore long. The greatest change was in the pistil, which may be best described as an ordinary flower, with calyx, petals, stamens, and carpels complete and normal, except that the latter were sessile instead of on a carpophore, in fact it was a flower within a flower.—*W. Wise, Launceston.*

REGISTER OF FIELD BOTANISTS.—The suggestion of Mr. Arthur D. Melvin, as to the formation of a Register of Field Botanists, is a most excellent one, and I should think calculated to increase the interest of SCIENCE-GOSSIP. I should propose that a sort of "Natural History Directory," with list of Natural History Societies, and the names and addresses of naturalists, their branches of study, and (as Mr. Bernard Hobson in another part of last month's number proposes) those willing to assist. This might be given in an extra Christmas number of SCIENCE-GOSSIP, and should meet with support, unless you thought it advisable to make the Christmas number always a double one, price 8*d.*—*J. Morton, President, Rochester Naturalists' Society.*

DURATION OF PLANT-LIFE.—The classification of plants as annuals, biennials, and perennials, is convenient for nurserymen and practical gardeners, but many observations have yet to be made before the value of such characters can be ascertained with so much precision as to be fairly considered scientific. Canterbury bells are called biennials, but often do not flower till their third year. Then they die after flowering, and that they are plants with strictly limited lives appears in general unquestionable; at least I thought so till the present year. Now, however, I have several plants in flower, raised from seed

sown last year, and two of them have produced offsets from the base of their stems, each forming a tuft of leaves which is unquestionably such a growth as may be expected to develope into a second flower stem next year. So then I have raised from the seed of the same plant (it may be from those of the same capsule), some plants that have not yet flowered, but will probably do so in the third year, some that are flowering in the second year, and will probably die after the fashion of biennials, and some also in flower and only differing from the last in that each plant has a lateral offset from the base of the stem, which promise a second flowering next year, after the fashion of perennial herbaceous plants. Thus we see how difficult it is to speak with anything like precision of plants as having limited lives, that character being apparently as liable to variation as any other of those which have been deemed specific. I know that the pimpernel survives the winter sometimes, though everybody calls it annual.—*John Gibbs.*

"THE HEREFORDSHIRE POMONA."—We have received Part II. of this magnificent work, edited by Robert Hogg, LL.D., and which is published by D. Bogue, 3 St. Martin's Place, Trafalgar Square, on behalf of the Woolhope Naturalists' Field Club. The numerous chromolithographic plates of the chief kinds of apples and pears are works of the very highest art. Indeed, we may say, we have seen nothing at all approaching them in this respect; and, highly as we felt ourselves obliged to speak of the first part of the "Pomona," this second part is superior in every respect, literary as well as artistic. We have a capitally written chapter on "Modern Apple Lore," by Dr. Bull; "The Life of Lord Scudamore" (with an admirable portrait), who was famous for his experiments in apple grafting, and his success in introducing various kinds of apples, also written by Dr. Bull; a paper on "The Cordon System of Growing Pears at Holme Lacy" (illustrated), by Sir H. Scudamore Stanhope, and detailed letter-press descriptions of the various kinds of apples and pears figured in the present part.

MUSHROOMS.—There is, I believe, a very general idea, that mushrooms are surely to be found in a wet autumn. My own experience, however—fully confirmed in this present year—is, that the main condition for their plentiful appearance is this: that the wet autumn should be preceded by a hot summer. I live in the immediate neighbourhood of downs, whence we usually gather them in, considerable, though varying, abundance; but this year, strange to say, I have not set eyes upon one of any sort or kind. Even the ordinary fungi, which are usually so plentiful,—e.g. the Fairy-ring Champignon, *Amanita muscaria*, *Agaricus melleus*, and the Coprini, &c., are this year hardly represented. It is a fair presumption that this unprecedented scarcity must arise from the remarkable wetness of the spring and summer; but it may be well to inquire in what way it has hindered the germination of the spores, whether by washing them deeply into the soil, or otherwise.—*C. W. Bingham.*

COLOUR BLINDNESS.—Many notices have lately appeared on this subject; they have all, however, referred to a defect in the optic nerve; but is it not possible that some of the facts stated may be attributed to an apparent change in colours caused by a change in the light? Certain flowers, for instance, show the natural colour when seen by day, but will appear to be of a totally different colour by candlelight; the change cannot be attributed to any defect in the optic nerve. Does it depend on any peculiarity in the flowers, or in the different decompositions of natural and artificial light?—*T. B. W.*

VEGETABLE "COMMENSALISM."—I have often noticed the "commensalism" of plants described by Dr. Taylor a short time since in SCIENCE-GOSSIP. When I knew very few mosses, I used to be puzzled with one particular moss that I knew at sight as well as I knew *Poa annua*, but I did not know its name. It was always associated with *Neckera complanata*, a moss I knew, and I therefore labelled my different gatherings of the unnamed moss—"always associated with *N. complanata*." One day I received from a friend a moss labelled *Anomodon viticulosus*, and before I had fairly opened the packet I recognised it as the companion of *N. complanata*. I could give instances of other mosses, but if I mention a few of the flowering plants often found together, it will be better for the generality of readers. I have observed all the following to be often together in West Yorkshire and Derbyshire, and some of them are noticed by Dr. Less, F.L.S., in the report of the Botanical Locality Record Club for 1877, "to fall naturally into groups, the integers composing which agree in having an almost identical horizontal distribution, and often a very similar vertical range as well."

Rhamnus catharticus. Ligustrum vulgare. Taxus baccata.	Thalictrum montanum. Cochlearia alpina. Asplenium viride.
Carduus heterophyllus. Trollius europæus. Rosa cærulea.	Spergularia rubra. Ornithopus perpusillus. Jasione montana.
Genista tinctoria. Malva moschata. Pimpinella magna. Pimpinella saxifraga.	Thlaspi alpestre. Alsine verna. And not far away, Hutchinsia petræa.
Rubus suberectus. Crepis paludosa. Myrrhis odorata. Stellaria nemorum.	Draba incana. Geranium sanguineum. Rubus saxatilis. Galium sylvestre.

I could give many more instances, if necessary, but I think the above will be familiar to all experienced field botanists.—*Wm. West, Bradford.*

ENGLISH PLANT NAMES.—We have received Part I. of "A Dictionary of English Plant Names," by James Britten, F.L.S., and Robert Holland, published for the English Dialect Society by Trübner and Co. With the exception of Dr. Prior, we do not know of two men who are better able to undertake

this work than the two botanists with whose names it is franked. A good deal of Dr. Prior's philological web-spinning is absent from the derivations here given, all of which are characterised rather by shrewd common sense, and an intimate knowledge of dialects and the modes of thought of the peasantry, than by philological learning. This will be a most valuable and useful work to the botanical student.

GEOLOGY.

ADVENTURES OF A GEOLOGIST.—The geologists of England, "who live at home at ease," know little of the perils under which some of their brethren of the hammer pursue their arduous studies in other countries. The following letter from a young, but already well-known and promising geologist, Mr. R. Lydekker, B.A., who is engaged as palæontolgist on the geological survey of India, will give some idea of the duties which fall to the lot of Indian geologists:—*Leh, Ladák, Aug.* 2, 1879:—"I returned yesterday from my trip to the Chinese frontier, near the Pangong Lake, after a very rough and somewhat disagreeable time. We were at an elevation of over 14,000 feet the whole time, and had to cross five passes close on 19,000. Living so long at such an elevation, is of course extremely trying; I could not sleep at night, and when I did doze off, soon woke up choking for breath. The sun in the day was terrible in its power, and has burnt the skin off my face; so that I am bleeding every minute, and have to keep it covered with butter. At night we had hard frosts when at the height of over 16,000 feet. This alternation of temperature gave me fever. We could not halt, as we should have been starved, and I had to do three twenty-five mile marches in a fever, when I could scarcely sit in the saddle, and yet, owing to the badness of the roads, was obliged to walk a great part of the way. To add to my misfortunes my cook also fell ill, and I had great difficulty in getting him along. I am, of course, a good deal knocked up after such a rough time, and very thin, but I am going to rest here for four or five days, which will, I hope, pick me up, and then I start for Simla, which I hope to reach early in October. At the end of the Pangong Lake I tried to cross over into Chinese Tibet, but was stopped by a party of Chinese soldiers, who threatened to seize my baggage, and I was obliged to make very significant signs with my revolver before they let go. The Pangong Lake is most lovely; it is about sixty miles in length—half of which is in Chinese territory, and consequently inaccessible. The water is of the clearest blue, highly impregnated with borax, which makes it unfit to drink. Imagine this, bordered by a beach of most dazzling white sand, and the whole surrounded by towering mountains of all shades of blue, red, and purple. Not a sign of life in the water—which forms a veritable dead sea—and not a blade of grass on the hills. Most of the country we passed through was totally uninhabited, and was indeed a "howling wilderness." Here and there, where there occur more or less green "oases" of grass, we came upon encampments of Nomad Tartars, with their curious dome-shaped black felt tents. Around these grassy patches there were generally large colonies of the yellow marmot, which set up a prodigious squeaking and squealing at our approach, and soon dived down into their burrows. Occasionally we found large numbers of the blue-tailed Tibetan hare, which made a pleasant addition to our larder. On the sandy plains we here and there came across droves of wild asses, which trotted round our caravan in distant circles, snorting and braying, and making mine and the Havildar's pony very restive. The Tibetan wild ass is a handsome animal, standing about 14·2, generally of a chestnut colour, with a stripe on the back and shoulder of a darker tint. In the Chang-Cheumo (Great Plain) valley, which runs parallel with the Pangong Lake, though separated by a lofty mountain range, there occur wide grassy plains; on these plains there are numbers of the magnificent Tibetan antelope (*Pantholops Hodgsonii*), with their long straight horns, which form has given rise (in all probability) to the legend of the unicorn. The animals stand as high as a large donkey, and have a deep red coat. The two mornings I halted in the Chang-Cheumo I saw heads of twelve or thirteen within a quarter of a mile of my tent. Unfortunately there was not cover for a cockroach on the plain, and though I several times tried to get near them on hands and knees, I was unable to get within 500 yards of them, and bagging them was accordingly out of the question, especially as my "Westley Richards" is only sighted up to 200 yards, point blank. I was, therefore obliged to turn my back on these splendid animals, as well as on the Chang-Cheumo Valley, neither of which I shall probably ever see again. The animals only inhabit that part of Kashmir territory, though common enough in inaccessible Chinese Tibet. Occasionally on our route, we met parties of Tartar traders coming from Chinese Tibet, with borax. All this borax is carried on the backs of large sheep and goats. Each animal carries a long bag loaded with about 5 lbs. at each end, and tied across its back. At night, all the sheep are tied up to a long string, like cavalry horses at a picket. The advantage of this mode of transport is, that sheep and goats get their own living, in the most barren regions. My own baggage was carried on yaks (the hairy cattle of Tibet); these beasts carry large loads, and can go up to any elevation. The only difficulty with them is, that they must have grass, for they will not eat grain. This sometimes gave us considerable trouble, as we found the yaks had broken loose, and we spent several hours in sending out exploring parties in search of them, with the result that we did not get under

weigh until mid-day, and not into camp until night. On another occasion, in crossing the Chang-Cheumo river, we had a little adventure with the yaks. The river, as is usual at this time of the year, was greatly swollen by the melting snows, and running at an enormous pace. My valet-boy (Behrer) was riding one of the yaks when they were driven into the river. Very soon they got out of their depth, and began to swim, being partly carried down by the current. The boy slipped off behind, and drifted down the stream. Luckily I was on my pony, and galloping down below, I pushed into the river and caught him as he passed. My pony, however, got out of his depth too, and I slipped off, fortunately managing to pull the boy to shore. We both had a narrow escape. We subsequently managed to cross the river with some difficulty, by means of a rope, lower down."

SUN-CRACKS.—While on an excursion of the Belfast Naturalists' Field Club recently, I observed a striking illustration of how the cracks found in the new red sandstone were formed. This was in one of the Scrabo quarries near Newtownards, co. Down, where we observed some clay, no doubt formed of the débris of the sandstone, cracked by the sun, and lying beside a large slab of sandstone beautifully marked in exactly the same manner. The way in which the cracks in both were formed strongly corroborate the general supposition as to their formation.—*J. M. Ward.*

LOCALITIES FOR FOSSIL STAR-FISH.—Many years ago I had the good fortune to obtain the rare and elegant star-fish *Protaster Salteri* (Forbes), as well as a species of Palæaster, which I cannot find figured. They, with an arm of *Glyptocrinus basalis* (McCoy), were found near together on the eastern side of Bala Lake, about a mile from Llangower, the locality being easily determined by the oval patch of Bala limestone which is marked on the geological map; the exact spot is shown by the arrow marking the dip at 30°. Mr. Salter found his specimen of *P. Salteri* at Pen-y-Gaer, near Cerrig-y-Druidion, eight miles north of Bala; I believe one surface only was obtained having two rays perfect. I was more fortunate, inasmuch as in mine both surfaces are quite perfect; it is somewhat smaller than the figure in Memoirs of the Geological Survey—Geology of North Wales, plate 23. Have any other examples of this beautiful little fossil been procured?—*Charles Ricketts.*

NOTES AND QUERIES.

INTELLIGENCE IN MAN AND ANIMALS.—In the interesting notes in your journal for September on the above subject, I am glad to see that two of your correspondents have suggested distinct definitions of "instinct" and "reason." For until the exact subject of discussion is defined, the discussion itself must be more or less confused and cross-purposed. Both Dr. Keegan and C. B. agree in the main idea of their respective definitions; and no doubt most would accept the same distinction, viz. that in *instinct* there is unconscious adaptation of means to ends, *one* direct inference through association of ideas; whilst in *reason* there is conscious and voluntary adaptation, and often a *chain* of inference in logical connection and order. But still, supposing some such definition to be accepted generally, it appears to me doubtful whether the main question is settled thereby. A clear field is gained; but discussion, it seems to me, is still possible. For instance, on one point in Dr. Keegan's note. He says about animals, "their method of working without a trace of hesitation, &c. . . . the identity of motive in almost every case, all unequivocally suggest the idea of an automaton mechanically operating." Now, if the former part of this sentence be admitted as certain, then, of course, the conclusion is correct and strong. But what if the premisses here assumed be open to challenge or doubt? Is not the argument here robbed of its whole force? And I certainly think that two of these assumptions are precarious at least:—the "working without a trace of hesitation" and the "identity of motive." Take the case of the dog, an animal admittedly the most "reasonable" or gifted with the highest instinct. Who has not over and over again observed hesitation in his conduct, especially in circumstances where a choice of actions had to be made. To all appearance the animal was considering balancing the two sides of the question, and at last—perhaps after some little time—*choosing* his course. Did he not then voluntarily decide on one of two purposes? or on one of two means to accomplish a purpose? There was first hesitation, then choice: two things, not generally attributed to any except "reasonable" beings. Again as to "identity of motive." No doubt in most cases a dog, like other animals (like his master, too often), is actuated by purely *selfish* motives. But are there not reliable instances recorded where a dog has shown clear *self-denial* and even *self-sacrifice*, qualities, by the way, hardly instinctive? Here are two contrary motives, selfish and unselfish: the "identity" is destroyed. Indeed I notice Dr. Keegan writes "identity . . in *almost* every case," which, though it evades objections, weakens his case. To give his conclusion any practical value and force the identity should be *in every case.* To revert to the definitions for a moment. I cannot subscribe all at once to C. B.'s conclusion that animals are unable to follow out a train of inferences. On the other hand, some actions of dogs seem to me very difficult to account for without supposing some such train to have actually passed (dare I say?) through their *mind.* The whole subject is most difficult, but most interesting. I am afraid it will never be absolutely settled until we know much more than we do about the world of mind and spirit.—*Y. M.*

INTELLIGENCE IN MAN AND ANIMALS.—Amongst the many theories given by some of your correspondents to account for the remarkable illustrations of intelligence exhibited by many dumb creatures, I fail to see one which will cover the entire ground. It must not be forgotten that there is no medium between matter and spirit. If the brain can secrete thought, as the liver secretes bile, then there is an end of all argument concerning the soul. But if not, we must allow that brutes have souls just as humans. The question of the soul's existence after death must be left to the theologian. For myself, I do not, acknowledge anything like instinct. "The hereditary transmission of acquired aptitudes" is a scientific fact. The knowledge an animal possesses when born is added to considerably as it grows older. If the knowledge instinctive is all an animal has, how must we explain its education? If an animal cannot

think, how must we explain all the voluntary actions which are so adapted to the occasion, and such as a man similarly situated would perform? I could enumerate some highly interesting facts concerning what I will call spontaneous intelligence; but they would occupy too much space. I will only say that if brutes were able to communicate their thoughts to one another as easily as humans, they would display still higher intelligence. If I could not converse with my fellow-man, I should be ignorant of much that I have learnt. I believe that animals have reasoning souls like men, but their powers of exchanging thoughts are inferior to ours, thus accounting for their inferior intelligence; but this inferiority is one of degree and not kind.—*A. W. King, Blackburn.*

INSTINCT AND REASON.—To me it seems that any one who knows the meaning of the word "reason," and denies to animals the thing, must be one of those men who seeing, see not, and hearing, do not understand. It is to me beyond belief that a man who has kept a pet, or has walked about with his eyes open, or has read or heard trustworthy tales of animals, if he knows the meaning of the two words, holds that animals have only "instinct," and not "reason."—*H.B.* From the "Rights of an Animal; a New Essay in Ethics," by Edward Byron Nicholson, M.A.

EYE-BRIGHT (*Euphrasia officinalis*).—This plant has been very luxuriant this season in some districts. One place in the neighbourhood of Park Place, Henley-on-Thames, was completely covered in August with its pretty white flowers. On the railway banks between Pinner and Bushey, I gathered plants with stems from 10 to 14 inches, with unusually fine flowers. The centaury (*Erythræa Centaurium*), has also been very fine and plentiful. Possibly the unprecedented wet season may have been favourable to both plants. Perhaps some of your numerous readers may have noticed a similar condition of both plants in other districts.—*J. W. Odell, Pinner.*

INTELLIGENCE IN ANTS.—Whilst weeding in the garden last August, I broke open the upper galleries of a nest of small black ants, and in so doing scattered a number of eggs, which had been carried up from below, that they might be warmed by the sun, which at the time was shining brightly. As I watched the ants gathering them into the nest, I noticed a little fellow dragging one, two or three times larger than himself, up what must have seemed to him a very steep hill; at last he stuck fast, and, after a few plucky efforts, he left the egg, made a few casts round the ground to see how the "land lay," and then returned to the egg, which he pulled up an easy ascent, of which he had been in search, and which was in quite another direction to the one in which he was going when he stuck fast.—*Thomas Winder, Sheffield.*

SAGACITY OF A PONY.—Having read with very great interest the numerous papers which have lately appeared in SCIENCE-GOSSIP and "Nature" upon the "Intelligence in Man and Animals," I venture to add to the already large list on the subject, by sending the following remarks upon a remarkable pony, which some short time since might have been seen daily grazing on the Cirencester College cricket-ground. The principal of that college kindly furnished my brother (one of the professors of the college) with the previous history of this sagacious animal, known by the name of Grimm, and it is as follows: Grimm was born and bred on the estate of Mr. Mussel, of Aden, near Aberdeen, Scotland, and sold by him, in 1852, to a gentleman who required a pony to carry his wife during his walking expeditions in Perthshire, with this caution, "Never drive him, or he will break your neck," as he had been notorious for previous bad conduct, and had previously smashed a pony-carriage. In the stable and in the field he was gentleness itself, but was found to be very headstrong and conceited (if one may attribute such a quality to a pony), and the few misfortunes that befell him during the thirty-four years of his life, his kind and indulgent owners attributed to this defect in his character. During Grimm's walking expeditions he must have played his mistress some very odd tricks, which she truly states must have cost thought and preparation, for he apparently always made his own arrangements for the day. One hot afternoon his mistress wished to ride some four miles to meet her husband, who was returning from Edinburgh. Until they arrived at a certain hill, Grimm was in all respects a model pony, when suddenly at this point he stopped, having decided that so far he would go, and no farther. All his mistress's endeavours to make him descend the hill were fruitless. At last, tired out with his rearing and jumping, she unadvisedly did, what he had along intended she should do, dismounted, and dragged him down the hill by the bridle, and then hoping she had won the day, she put her foot into the stirrup to spring into the saddle, but he had been waiting for that moment, and before she could accomplish her purpose, found herself flat on the road, and on looking round, saw Grimm merrily galloping home. His memory for places and people is described as extraordinary, and on one certain day, and that only, would he take his mistress in turn to each shop she was in the habit of visiting. He learnt to open any kind of door, and would turn handles and keys, also lift latches, so that unless care was taken to lock him into his stable from the outside, he was certain to walk out again when the coast was clear. Having a large stable-yard in which he walked about in perfect freedom, his amusement was to open the door of the scullery, and steal the greens the cook was washing for dinner. She being quite deaf, was unconscious of his presence until she felt his warm nose on her shoulder, and saw her cabbage whisked off. He hated solitude, and was always happy when the dogs and their puppies were occupying the stall next to him. Grimm never accidentally injured the smallest puppy. The cat kept her kittens in his manger, and the proceedings of the family gave him much interest. This affectionate disposition was further exemplified in several ways. He expected his mistress to come and see him often, and once when she had been prevented by illness, and had not seen him for a fortnight, he determined upon reversing the order of things, and went to see her, walking through the hall to the drawing-room door, which he opened as usual; and great was her astonishment to see him triumphantly nodding his head, as if relieved to find she had not entirely disappeared. In 1862 Grimm met with a serious accident, one of his fore-legs was injured, and he ever afterwards lifted it up for inspection when his mistress appeared, and thus learnt to shake hands. On his recovery a pony was bought to drive with him, and he was placed in double harness. He was devoted to his companion, and gnawed a hole at once in the partition between the stalls to improve the means of communication. Various other anecdotes might be told of this remarkable and intelligent pony, but he soon became unfit after this period for work, and was received into the pastures of the Agricultural College, Cirencester, where he obtained a home and every comfort until death terminated his eventful career.—*E. Edwards.*

THE ROBIN.—In the months of November and December last year, I, after great perseverance and coaxing, made friends with a robin in my garden. My first introduction to my little redbreast was when forking up some ground, he perched on a tree and darted down for worms. After a few days he would stop on the ground and wait for them, and allow me to throw them to him. I then began to try him with bread and biscuit, to take it from my hand, but to no purpose; he would allow me to come very near him, but would fly away when I held out my hand with food. I still coaxed him day after day with different kinds of things, worms, &c., and at last succeeded with some tempting pieces of cheese, in the following manner, first by calling him from the shrubbery, where he was generally to be found, and as his favourite place was perching on a low boarded fence, I used to hold out my hand with the cheese for his inspection, then place my hand on the fence near him, and it was very amusing to see the shy way in which he would hop a little nearer and nearer, and peck up a piece and fly off into the trees, then return to my hand again until satisfied. After about a week of this the little fellow had confidence in me, and would come when called and perch on my hand and feed. After a while he would also come to my father, and we both took great interest in him and fed him during the winter. In the spring, when nesting-time came, we saw no more of him. However, at the beginning of this month (September), I was talking to the gardener, who was digging potatoes, when I heard a robin singing in one of the apple-trees, and I began telling him the story about the robin that used to feed from my hand, and I said to him, I wonder if this is my little friend; I will try him. I happened to have some biscuit in my pocket. I crumbled some in my hand, and gave my usual call to him, and much to our astonishment, he flew from the tree and took the biscuit three or four times in succession, then flew off into the trees, and I saw no more of him that day. I at once came to the conclusion it must be the same bird, who had not forgotten my past kindness to him. This is a wonderful instance of memory in birds.—*S. Griffin, Salisbury.*

BOOKS ON ENTOMOLOGY, &c.—Having read the "Aid to the Choice of Books on Botany," I think it very instructive and useful to those who wish to study it. Such articles as those save the young student a great deal of trouble and disappointment through not knowing which are the best books. I should esteem it a great favour if you or some of the readers of SCIENCE-GOSSIP would write an article similar to the one on the choice of books on botany, by Bernard Hobson, only to aid in the choice of books on entomology, geology, &c. I think it would be very acceptable to many young entomologists and others.—*F. J. Francis.*

CURIOUS SITES FOR BIRDS' NESTS.—Your correspondent F. F., referring to my note on curious sites for birds' nests, may throw aside any doubts he may have with regard to the original architect of the nest alluded to by me, as the magpie is the only bird that builds that class of nest with a dome, and it is so strongly built, that it will bear the blasts of five or six winters in sheltered situations, and is then not considered too dilapidated for the kestrel, that in my experience never does build its own nest, and when it lays in a hole in a tree or cleft of a broken limb, makes about the same nest as an owl, nothing more than a quantity of pellets of fur and feathers, that it had thrown up while at roost or possibly sitting. Our Selborne district used to be much troubled by magpies a few years back, but the damage done by them to pheasant and hen-coops, induced a war of extermination, and where I have counted fifty at a time, it is now rare to see a pair; they are easily started from the nest, by a sharp blow to the trunk of the tree. Jays and magpies, though generally very wary and shy, are very bold in defence of their young when just fliers, are easily killed by imitating the cry of a young one in trouble, which can be done by a split stick and leaf, or a blade of grass between the thumbs, and if a young one be caught alive or winged, you are almost sure of the old birds.—*G. T.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

F. H. HABBEN.—The so-called "Vegetable growth" is not a fungus, but the stalked eggs of the lace-wing fly *(Chrysopa vulgaris)*.

JOHN SLATER.—The insects attacking the ears of corn are a species of Aphis, or "plant-louse," and they have undoubtedly appeared on the ears by reason of the continued wet weather. It is not a "new pest."

S. BRENAN.—We are sorry to say the box full of fungi reached us in such an utterly smashed up condition, that there remained nothing but pulpy fragments, which were quite undeterminable. The smaller box contained, not a lichen, but a well-known alga, which often appears on gravel walks at this time of the year, *Nostoc commune*.

D. N.—The fragment of slate from the quarries at Llanberis was impressed with the black dendritic crystallisation of oxide of manganese. It is not a fossil.

W. MARTIN.—Any ordinary microscope would enable you to examine the structure of the leaves and fruits of mosses. You can purchase a capital instrument at any good maker's for about five guineas.

H. MILLER (Accrington).—A capital book for the purpose you require is Nicholson's "Manual of Palæontology" (publisher, Blackwood). For characteristic tertiary fossils, we recommend the Charts published by Tennant, Strand, London, at 7*s*. 6*d*.

J. J. MORGAN.—It is difficult to pronounce on a plant from so small a portion as that sent, but we have no doubt that it is a variety of the orpine *(Sedum Telephium)*.

W. BENNER.—We should think you might be able to procure any of the small species of living quadrupeds from London dealers, or inquire in our "Exchange" column, stating what species you want.

A. D. MELVIN.—Will this gentleman (who mooted the idea of a Register of Field Botanists) kindly send us his full address?

DR. MORTON.—There is a Postal Microscopical Society already in existence. The idea was started in the pages of SCIENCE-GOSSIP in 1872 and 1873, which please see for rules, membership, &c. We understand this society is working in an excellent manner.

HERBERT BISHOP.—We are always willing to help students, but not to do for them what we know is best they should do for themselves. For instance, in naming fossils, as you live in London, it would be much better for you to take them to such a museum as that of the School of Mines, Jermyn Street, and name them yourself from the specimens there exhibited. Such a plan would impress the names of the fossils much better upon your memory than if they were named for you.

J. S. ILSLEY.—Many thanks for your offer; we should much like a little of the Sargasso-weed with the zoophytes on it.

T. G. HARRIS.—Taylor's "Half Hours at the Seaside," and Wood's "Common Objects of the Seashore," will enable you to name nearly all the objects you are likely to pick up. Many thanks for your kind offers. You could not get a more suitable book on microscopic fungi than that by Dr. Cooke, nor indeed a better work on the larger British fungi than the cheap popular one by the same author (both published by D. Bogue). Smith's "Ferns, British and Foreign" is the best and cheapest on that subject; and for sea-weeds, get Grattan's book, published at the *Bazaar* office, or Dr. Landsborough's, both are cheap.

EXCHANGES.

WILL exchange Murby's photophysical wall map of the world, for Sachs' Botany, or Jukes and Geikie's Geology, and a few good fossils.—T. Tate, Thornbury, Bradford, Yorkshire.

ANCULA CRISTATA, or well-mounted palate for *Cylichna cylindrica* or *Scalaria communis* (animal and shell).—J. Turner, Davenport, Stockport.

FOSSILS in exchange for minerals.—Rev. H. B. Capel, Great Eastern Rectory, Dunmow.

BIRD eggs and lepidoptera, in exchange for other not in collection. Many common butterflies wanted, also foreign ones. —J. A. Wheldon, South Parade, Northallerton.

I HAVE several duplicates of six spot Burnet moth *(Anthrocera filipendulæ)*, which I shall be glad to exchange for other entomological specimens.—F. Carter, 1 Tollington Place, Tollington Park, London, N.

BRITISH shells. List of desiderata on application.—Henry Coates, Bridgend House, Perth.

FINE mounted scales or insect of *Podura curvicollis*, in exchange for other slides.—T. Forty, Buckingham.

STUDENT'S compound monocular microscope in case, with polariscope and condenser on stand. What offers?—J. Liddy, 6 Harrison Street, Kingsland.

SAND from estuary of Thames or from alluvial deposit in Isle of Sheppey, containing foraminifera, entomostraca, and *Triceratum favus*, and several discoidal species of diatoms in exchange for well-mounted slides.—W. H. Shrubsole, F.G.S., Sheerness-on-Sea.

NEATLY finished slide of spider *(E. diadema)* mounted whole, offered for good slide of selected diatoms or geological sections. —J. Neville, Wellington Road, Handsworth, Birmingham.

ALGÆ, zoophytes, and sponges, from the Firth of Forth, in exchange for other algæ, zoophytes, and sponges, principally zoophytes named and localised.—Andrew Edmondsbone, 6 Huntly Street, Edinburgh.

I HAVE for exchange sets of forty specimens, seventeen species of greensand fossils, including amongst others, teeth, vertebra, and shells. Wanted specimens from other formations.—J. Arthur Floyd, Alcester, Warwickshire.

A FEW specimens of 55, 367, 394, 539, 1040, offered in exchange for plants peculiar to the south of England. Address, S. E. L., 2 King Street, Penrith.

EXCHANGE *Spartina stricta* for any of the following grasses: 1521, 1529, 1545, 1554, 1581, 1596, 1597.—Rev. F. H. Arnold, Fishbourne, Chichester.

A GREAT variety of most interesting unmounted material mostly marine, list free; also some really grand slides of marine algæ, with diatoms in situ, &c. Marine algæ in variety, well-mounted and named on suitable paper. Ditto, on glass for lantern slides, really splendid. Wanted, first class micro, or lantern slides, photo apparatus, stereoscope, &c., part cash if desired.—J. McGann, Burren, co. Clare.

WANTED, *Helix obvulata, H. sericea, H. granulata, Clausilia biplicata*, &c.; other British shells offered in exchange. Apply to J. W. Cundall, Carrville, Alexandra Park, Redland, Bristol.

WANTED, a specimen or two of the British *Comatula rosea* in its young stalked stage, a liberal exchange in micro slides or cash.—F. Walker, Heywood, Tenby.

ONE and a half inch micro objective, micro slides, old English coins, many in mint state, and proof engravings after Landseer, Reynolds, and Lawrence, for the following desiderata:—Allman's "Freshwater Polyzoa," Hooker's "Student's Flora," Babington's "Manual of British Botany," proof engravings after Turner, or slate and plate glass aquarium.—W. T. Jones, 15 Fairbank Street, City Road, London.

ENTOMOSTRACA, *Temora Finmarchica*, mounted in balsam, for any good slide; crustacea or echinodermata preferred.—E. Lovett, Holly Mount, Croydon.

FOR hair of *Ornithorhynchus paradoxus* (unmounted), send other object of interest to Mrs. Skilton, London Road, Brentford, Middlesex.

WELL-finished slides offered of *Chroolepus aureus, Lyngbya muralis*, ascospores of Peziza, ascospores of Ascobulus, *Æcidium tussilaginis*, &c., for slides of polycistina, named diatoms, insects, or animal tissues.—William West, 15 Horton Place, Bradford.

WANTED, parasites and diatoms, named and mounted in balsam, in exchange for other mounted objects; send list to W. H. Symons, 2 Queen's Terrace, St. John's Wood, N.W.

WANTED, "Hogg on the Microscope," and Tait's "Land and Fresh-water Shells," first-class insect slides in exchange. Address, H. Insley, 150 Great King Street, Birmingham.

WILL any lady or gentleman abroad (any country) gather me specimens of sea-weeds, zoophytes, and mosses? They need not be mounted. British specimens of above offered in exchange, also beautiful bouquets of natural flowers and flowers mounted on cardboard. Butterflies also wanted from abroad. Send per sample post, stating what exchange is required, to B. B. Scott, 24 Seldon Street, Kensington, Liverpool, England.

WANTED, living specimens of rare British plants (especially critical species and varieties), in exchange for other rare (living) British plants. Lists exchanged.—A. B., 107 High Street, Croydon, Surrey.

WANTED, standard work on Entomology, or microscopic marine objects (unmounted); offered French ⅛ inch triplet objective; sketches of British insects by Houghton (quite new). L. Clarke's microscopic objects, slides, &c.—R. Brauer, Cresswell Grove, Albert Park, Didsbury, Manchester.

FINE collection of chalk fossils and micro-slides in exchange for minerals, especially fine crystals of fluor spar, calc spar, quartz, galena, &c.—A. Butt, Vine Cottage, Perry Vale, Forest Hill, S.E.

WANTED, skeletons of birds, reptiles, and small mammals, lepidoptera, and casts of fishes. Exchange micro objects, &c.—J. P. Wright, 27 Sunnybank Terrace, Undercliffe Lane, Bradford, Yorkshire.

FOR exchange, a few specimens of *Chrysomela distinguenda*, for other rare beetles; also British plants. Lists exchanged.—G. Robson, 92 Cranbourne Street, Leicester.

MACROCYCLIS CONCAVA, *Zonites ligerus, Helix exoleta, elevata, thyroides, alternata, appressa, tridentata, striatella, &c., Sphærium stamineum, Unio crassidens, Pleurocera canaliculatum* and many other American land and fresh-water shells, offered for *Testacella Haliotidea, Succinea oblonga, Helix lamellata, revelata, obvoluta, Vertigo pusilla, angustior, Acme lineata*, or foreign land and fresh-water shells.—Edward Collier, 7 Dale Street, Manchester.

KESTREL, sparrow-hawk, golden crested wren, magpie, pheasant, red grouse, golden plover, common snipe, landrail, coot, wild duck, guillemot, black-headed gull, and others, desiderata, British birds' eggs.—A. Smith, 8 South Mount Street, Aberdeen.

"LONDON CATALOGUE," 7th edition, offered 79, 135, 140, 174, 177, 245, 260, 293, 316, 369, 528, 567, 613, 627, 683, 692, 841b, 858, 913, 923, 934, 1057, 1072, 1141, 1142, 1565, 1641, 1665b. *Mentha crispa* (L.), *Sisymbrium pannonicum* (Jacq.), and *Xanthium spinosum* and others, in exchange for 5, 7, 9, 10, 296, 758, 829, 1127, 1129, 1201, and others.—A. E. Lomax, Heath Terrace, Woodchurch Road, Birkenhead.

BERKELEY'S "Cryptogamic Botany," Quekett's "Histology," Roscoe's "Spectrum Analysis," Herschell's "Astronomy," Knapp's "Journal of a Naturalist," Gosse's "Devonshire Coast," and "Tenby," and the following Ray Society's publications, viz.:—Burmeister's "Organisation of Trilobites," Forbes' "Naked-eyed Medusæ," Oken's "Elements of Physio-Philosophy," "Reports and Papers on Botany," and "Zoology," Meyen's "Botanical Geography," "Correspondence of Jno. Ray." For some of the foregoing, I want Allman's "Freshwater Polyzoa," Pritchard's "Infusoria," Bowerbank's "Spongiadæ." Standard botanical works and some of Ruskin's.—B. G. Whiteman, 47 Belvedere Road, London, S.E.

P. HIPPOCAMPUS, pure, dry, and balsam slides. Also other pure gatherings. Wanted a good sample of the Yarra deposit. —W. M. Paterson, Loftus.

DUPLICATES of the following good British land and freshwater shells offered in exchange for other desiderata—*L. Burnetti*, same variety as *lacustris* (Loch Skeno specimens taken this season), *L. involuta, S. oblonga, Vertigo pusilla, V. substriata, V. alpestris, V. minutissima, V. angustior*, desiderata, good foreign land shells or British birds' eggs, numerous sorts wanted.—W. Sutton, Upper Claremont, Newcastle-upon-Tyne.

WANTED, tropical beetles or butterflies, in exchange for a barn owl in glass case, or very fine cocoons of the American moth Cecropia.—Joseph Bates, High Street, Wellingborough.

BOOKS, ETC., RECEIVED.

"Reports and Proceedings of the Manchester Field Naturalists' Society, 1878."

"Report of the Entomologist." C. V. Riley.

"Proceedings of the Liverpool Naturalists' Field Club, 1878-9."

"Report of the North Staffordshire Naturalists' Field Club, 1878."

"Proceedings of Geologists' Association."

"Bulletin of the United States Geological Survey," vol. v.

"Feuille des Jeunes Naturalistes."

"Les Mondes."

"Scottish Naturalist."

"Midland Naturalist."

"Popular Science Review."

"Canadian Entomologist."

"Science News" (New York).

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 10TH ULT. FROM:—E. E.—T. W. M.—A. J. B.—T. J. B.—T. G. H.—D. D.—T. R. E.—C. F. G.—J. L.—R. F. O.—J. A. W.—W. H. S.—J. J. M.—T. W.—T. H. H.—R. S.—F. J. F.—J. F.—G. M. D.—H. M.—H. B.—A. H. B.—Dr. M.—G. T.—H. C.—J. W. O.—J. P. T.—H. B. C.—S. G.—F. C.—A. W. K.—J. A. jun.—Dr. C. R.—F. H. L.—J. D. M.—J. M. C.—C. H. D.—J. T.—H. M.—F. H. A.—T. S.—C. W. S.—D. N.—S. A. B.—W. T. J.—M. F.—F. W.—A. E. L.—J. W. C.—J. A. F.—A. B.—W. S.—H. I.—B. B. S.—T. B. W.—W. L.—W. H. S.—M. S.—E. L.—J. F.—W. W.—H. S.—A. E.—A. B.—R. B.—E. C.—J. H.—J. P. W.—G. R.—J. N.—W. A. L.—B. G. W.—C. W. B—A. S.—S. E. L.—W. M.—T. H. P.—T. McG.—B. H.—H. E. F.—&c.

THE GEOLOGY OF THE LINCOLNSHIRE MARSHLAND.

By A. J. JUKES-BROWNE, B.A., F.G.S., etc.

[*Continued from p.* 245.]

LET my readers imagine all I mentioned in my last article as taking place on the Lincolnshire coast before the marshland was formed, and when the edge of the chalk wolds was presented to the sea as a bold line of cliffs, from which quantities of chalk rubbish fell on the ice-foot below: outside they must imagine a sea full of icebergs and ice-floes borne southwards from more northerly shores, and when driven by storms upon the coast adding their foreign freights of mud and stones to the local material out of which the gravels and boulder clays were being made. By picturing this state of things, they will understand how these peculiar deposits came into existence, why they are laid down so unevenly and irregularly, why their surface presents so many mounds and hummocks, why they are so full of pieces of chalk, and how the large blocks and boulders of other rocks came to be mixed up together in the same formation.

These glacial conditions lasted for a long time, but gradually the winters became less severe and the summers longer, if not warmer, the ice melted away and left its last burden of mud and stones to form the surface of the rolling hummocky ground which now rose gradually from the waves and stretched far eastward beyond its present limits over the ground now occupied by the marshes and far out into the German Ocean. But change, ceaseless change and movement, is ever Nature's order of the day, and before long a reverse movement of depression set in which enabled the sea-waves to attack this rolling plain of boulder clay, and eventually to destroy the greater part of it, gradually eating back its edge, till only a narrow strip remained which now separates the wold from the marshes.

Without stopping to inquire what prevented its entire destruction, we content ourselves with observing that some change occurred, possibly in the set of the currents along the shore, which checked the process of erosion and prevented the rapid removal of the material gained from the land. The result of this change would be to cause the formation of sandbanks, and the silting up of the bays and inlets along the coast line, and thus were formed the silts and clays, which lie at the bottom of the marsh deposits (or Post-glacial beds) shown in the section of the well at Mablethorpe.

The reason of the greater thickness of the glacial clays at Anderby can now be understood; this place is in close proximity to a promontory of boulder clay, which for some reason did not suffer so much erosion as other portions of the formation to the northward. This district must therefore have continued to remain above water, while the lower beds of the post-glacial series were deposited at Mablethorpe; and some parts of it were never altogether submerged, but even now form low mounds rising above the level of the surrounding marsh.

The submergence above spoken of did not continue without cessation, but there were probably pauses during which the land was stationary for some time, and when the silted up shore gradually passed into the condition of a salt marsh just as such marshes are being formed at the present time along the shores of the Wash. The vegetation which would flourish and decay in such places, furnished the black peaty matter occurring in the upper part of these marsh clays; while the beds of turf or peat, with trunks of trees which are found in many places, prove that large forests grew and decayed on the higher parts of this marshy land; but the overlying beds of clay and silt

(often containing sea-shells) show that from time to time the forests were inundated and destroyed by the waters of the sea, and were buried beneath the muddy deposits which resulted from the inundation.

Even in historical times, the sea has often broken through the sandhills and has flooded large tracts of the marsh behind them, and the result of such inundations has always been to raise the surface of the land, by warping it up with the silt deposited from the muddy waters as they gradually evaporated.

The stiff brown clay which immediately underlies the soil near Mablethorpe, and in most other parts of the Wash, is probably the latest *warp* or sediment deposited in this manner, and some of it has doubtless been formed since the earliest banks and drains were made.

Thus was gradually built up the thick mass of clays, generally between thirty and fifty feet thick, which lies below the Lincolnshire marshland. Many centuries must have been occupied in its formation; but the climate does not seem to have differed much from that which we now enjoy, the shells are of the same species as those which now live on the Mablethorpe shore, and the trees are chiefly oak, birch and willow, like those which now exist on clay soils. It is possible, however, that the greater height of the land and the wider extent of forest growth, caused the rainfall to be greater than it is at the present time. Modern geology admits no great cataclysms or convulsions of nature, except where volcanic action has come into play, and of that there is no trace in Lincolnshire; All the changes above described have been produced by a gradual change of climate, accompanied by slow and comparatively slight movements of the land, and by the constant operation of waves, tides and currents.

The only other physical feature which remains to be accounted for is the long line of sand-hills which form a border to the marshes and protect them from the inroads of the sea. The mode in which these and similar *dunes* have been slowly built up to their present height, has often been described—the growth of grass and reeds along the margin of the shore, the arrest of the drifting sand and its accumulation round the patches of vegetation, shifting, yet ever rising higher and becoming firmer with the matted growth of reeds and other plants, till by degrees a barrier of steep sand-hills is raised by the action of wind and waves.

It is possible that the origin of these dates back to the time when the area first began to silt up, and that the marsh land has never been without a protecting fringe of sand dunes. It is certain that they have shifted their positions from time to time according as storms and changing currents have caused the loss or gain of land at different points; of one such alteration we have evidence in the low ridge called Croft Bank, along which the Roman road is carried from Wainfleet to Skegness; this appears to have been a sandy beach at one time, and was probably backed by a line of sandhills, but the shore in front gradually silted up and formed the marsh which now intervenes between Croft Bank and the present sea margin, while a new line of sand hills began to be formed along its edge.

There is one other feature of interest connected with this part of the Lincolnshire coast, and that is the ancient forest bed which is exposed for some distance along the shore at low water. Mr. T. W. Wallis has recently given some account of this, as seen at Mablethorpe on the occasion of an unusually low tide (Sept. 28, 1878);* the following may be quoted from his description:—

"At this low water the old partly-submerged forest was well exposed, as far as the eye could reach, right and left, and many miles beyond. The width of the old forest exposed was great, but a succession of points of tree stumps kept appearing, far into the sea, so as to prove we saw only a portion of the old forest. Some of these tree stumps at Mablethorpe are very large, with large root arms branching out, but the major part were small trees; they are very numerous and stand from one to three feet above the clay, they are firm and sound, generally the upper end of each stump tapers to a point, caused by the long continued friction of the sea. I selected the most handsome stump, one literally encrusted with small shell fish, it stands about twenty inches high, and has been about ten inches in diameter, though perhaps only about a quarter of its original bulk remains. I had about one half of it cut off by a cross-cut; the wood is fir, and by counting the layers of growth I make it out to have been one hundred years old."

The origin and date of this ancient forest bed has not yet been fully investigated; it may be the termination of one of those which occur underground in the marsh behind, or it may be a more recent growth upon ground which has subsequently sunk beneath the sea. I am strongly inclined however to think that the former will prove to be the correct view of the case.

We have now reached the end of the geological record; how long the land remained in an unreclaimed state we have no means of knowing, but the early British found food and shelter among its woods and marshes, and are believed to have constructed certain banks and drains, but these are matters which come rather within the province of archæology and we leave the antiquary and the historian to take up the pen which the geologist here lays down.

LOCALITIES FOR FOSSIL STAR-FISH.—I am glad to inform Dr. Charles Ricketts, that I also obtained a specimen of *Protaster Salteri*, near Llangower, about two years ago; both sides perfect."—*Owen Rees.*

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* In the *Louth Times* for May 3, 1873.

FROZEN-OVER FISH-PONDS.

By W. A. LLOYD.

IN the September number of SCIENCE-GOSSIP, pages 193, 194, there is an inquiry by a writer signing "Piscator," respecting the manner in which fish can breathe when the water they are in is thickly and completely frozen-over for prolonged periods. Water, of course, is valueless for respiratory purposes, unless it contains a sufficient quantity of atmospheric air, a large amount of which consists of the oxygen which is necessary to revivify the blood of the creatures which breathe such water, and thus, in the manner which the writer correctly describes, the carbonised blood enters the gills at one part, and in a decarbonised, or purified state, leaves them at another part. These gills are arranged, in most or many water-breathing animals, like combs, the teeth of which the water surrounds, and supposing each tooth to be a tube through which the blood or other vital fluid flows, the walls of the tooth, or tube, are made so thin, that the blood within and the water without, can touch each other freely without mixing, one purifying the other, this being done in this beautifully contrived apparatus, in a small bulk, packed, in the case of fishes, just within the gill cover in the rear and sides of the head. The blood is set in motion, or circulated round and round in the creature's body, by the pulsations of the heart, while the surrounding water is similarly caused to flow, and to circulate, by the constant opening and closing of the mouth, these two pumps (the mouth and the heart) thus continuously working in conjunction with each other, and absolutely never stopping, so long as the creature lives. And, to serve both pumps, the water in which the fish lives has the property of absorbing by contact a given amount of air from the atmosphere at given temperatures. When the temperature is high, the quantity of air which water can take up and retain is much less than when it is cold. Thus, in hot weather, we often see a fish in a glass globe or other vessel, gulping water from the very surface of the fluid, because there it is in immediate contact with the atmosphere where the aeration is greatest, and thus the instinct of the fish teaches it to pass over its gills this fluid which has thus been oxygenated, in preference to going below for it, where the water is less aerated, and therefore, in effect, less pure. But, at a colder season, the same fish, in the same water, in the same vessel, in the same spot, and under the same circumstances, in all respects except temperature, may be observed less painfully (because in a less constrained position demanding exertion all to one end) swimming about below the surface, with the double pumps at work as ceaselessly as ever. Certainly, therefore, it might be supposed that the fish would die, if, on the one hand, the water were to be so warm that it would not retain enough air in solution, no matter how fast and well the mouth-pump worked. And, on the other hand, it might as truly be imagined that the fish would no live—no matter how favourable the temperature might be for the absorption and retention of air—if no air could get to the water by its being for a considerable time closely covered over, as for example, by ice. But, even though the water is thus fast sealed up for a long time by a thick covering of ice, its coolness, which the ice imparts, tends to cause it to retain, the more easily, such air as it does already contain in solution. And then, too, cold retards the vital energies of the fish, and causes its respiration to be slower, and the need for the air to be consequently less, so that here are two favourable conjunctions—greater supply and less demand.

But is it absolutely certain that such frozen-up lakes have no communication with open water? How, and with what streams, are these ponds or tarns fed or supplied in summer? Cannot they be traced in winter, and, if so, is it quite sure that no water runs through them, or beneath their ice, at that time? It would be not very difficult for an ingenious person to detect if any current exists beneath the surface of any ice-bound pieces of water. I could do so in the coming winter with an absolute certainty of obtaining correct results. For example, vertical holes might be bored in the ice, and in these orifices might be firmly inserted wide glass tubes, say of an inch and a half internal bore, with both ends open, one in the water below, and one in the air above. And in such tubes, supported or hung by light rods or wires, could be placed various indexes, some for showing vertical motion, others to point out horizontal currents, and some to exhibit rotary or obliquely-running streams. It would be a very cheap thing to have three, or even more, of such tubes, each having its own office. There come other considerations, too. Thus, if by reason of a slower respiration caused by a lower temperature, there be less energy, there is also a smaller consumption of food to be thought of, and less excrement to be voided, and less sullying of the water thereby, accompanied by smaller demand for oxygen to consume or get rid of the results of such voiding. Added to this, the water is, because of its icy covering, much less liable to receive excrementitious substances from land animals at or near its margin, or from birds flying over it, and indeed all dirt is hindered from entering by such covering, every small prevention of impurity being thus of consequence.

Certainly, a thick coating of ice would, especially if covered with snow, also hinder the penetration of light, and the growth would thus be partly debarred of the influence of the subaquatic vegetation which so much and indeed indispensably assists the purity and decarbonisation of the water. But this would not amount to actual darkness and complete hindrance of the office of the plants. It would only be a retardation, and one, moreover, occurring when it could best be afforded.

Connected with this subject is the wonderful pro-

vision which is made by means of which, that, while water obeys the same general law as that governing all other substances, that of increasing in bulk by heat, and decreasing by cold, yet, *at the moment of actual freezing* it swells and becomes light. And thus it is that ice swims on water. If, on the contrary, it sank, more ice would form on the top of the water of a lake, or pond, or river, and it would sink also, and then in a short time accumulated masses of superincumbent ice would be formed, so great, that no summer's sun in this country could melt them, while every creature in such waters would perish, or rather, would never exist. And our climate would be affected in a marked manner by the omission of this other only apparently small matter, namely, the inability of heat or cold to travel downwards in water as quickly as upwards. As it is, a limited coating of ice, of thickness varying according to temperature, forms on the surfaces of water, and nearly all remains below it comfortably protected, because of the feeble conduction of cold by the ice, till returning spring. And it seems almost approaching a too great presumption for a mere mortal to admire the framing of the law which permits this slow travelling downwards of heat in water, to compensate for the equally necessary high specific heat, or *great capacity for receiving and retaining heat*, which water possesses above all other known substances, liquid or solid. As it is, the slow *downward* progress of heat through water, prevents the sun of summer from killing the plants and cold-blooded animals in it.

Sea water requires a much greater cold to freeze it than fresh water does; hence (conjoined with the motion of the ocean around England and many other countries), we seldom have ice-bound marine coasts. And hence animals of salt waters, which are in many points different to those of fresh water, and more liable from their structure and sedentary habit to be injured mechanically by such ice, as well as by its cold, are not so harmed, by reason of these wise modifications of laws. And even when sea water does freeze, its ice is not salt, but fresh, and thus, by its specific gravity being much less than that of the water in which it floats, it stands comparatively higher out of that fluid than if the latter were fresh water, and thus winds undoubtedly get a greater hold on it, and its dispersion is the speedier. And if sea water froze as readily as fresh water does, so that our islands of Britain were surrounded periodically by masses of ice, their presence generally, and the increased coldness of the winds blowing over them, would materially change our climate.

How amazingly wonderful is all this interdependence of cause on cause, and law on law, no matter how small or trifling they may appear to our dull wits:—

"And if each system in gradation roll,
Alike essential to the amazing whole,
The least confusion, but in *one*, not all,
That system only, but the *whole* must fall."*

Lower Norwood.

* The above four lines I lately read in the *Times* newspaper for 1831. No author's name is given, but I should be glad to know it.

ORNITHOLOGICAL ESSAYS.

No. III.—The Sparrowhawk (*concluded*).

By Tom Wm. Dealy.

Next to the kestrel (*Falco tinnunculus*) the sparrowhawk is the commonest of the birds of prey which inhabit the British Isles. Its favourite resorts are among the wooded districts of mountainous regions, or in extensive demesnes, also in various situations, where, amid the savage repose of nature, it can bring up its young in undisturbed tranquillity; yet where it is within easy access of places whence it can command a sufficient supply of sustenance. Though this hawk nestles in woods, it beats about in more open situations,

Fig. 196.—The Merlin *(Falco æsalon)*.

such as along the borders of some well tended preserve. See how stealthily, watch how warily, it flies in subdued speed up the hedgerow, and down the side of yonder plantation, on the alert for its morning meal.

In Scotland, according to Macgillivray, both the merlin (*Falco æsalon*) and the kestrel are familiarly known by the name of sparrowhawk. Like all others of the Falconidæ, it has to flee before the unrelenting hand of agriculture. Some murmur at this, and would fain see birds adapt themselves to the alterations of the land's surface. And yet, how incongruous it would appear to behold the golden eagle (*Aquila chrysaetos*), in all its slow majesty of wing over our meadow lands. Much as we regret

the disappearance of the more striking of our feathered friends, we must visit their haunts; a man who goes to look for the eyrie of a golden eagle in a flat dreary saltmarsh, would be as inconsistent as he who eagerly inquires for the beautiful bearded tit among the precipitous ranges of the Grampians.

The sparrowhawk may be said to be generally distributed over the United Kingdom. In Ireland Mr. Thompson says it is "common throughout the enclosed and wooded parts." In Scotland it is no less abundant, breeding in the adjoining islands, on the rocks which encircle them. This bird annually rears its brood on the cliffs of the Isle of May (Firth of Forth), or did so as recently as 1876. According to different writers, it is found generally dispersed over the whole of the continent of Europe. In Norway, Sweden, and Denmark (vide "Old Bushman") it is commonly seen. He procured both eggs and birds of this species, as far north as Quickiock, in Lapland. According to the same writer, it is known by the name of "sparl hôk" in Sweden. It also extends its range to Asia, as far east as Japan, from whence specimens of this bird are said to have been received. In Africa also has it been observed, in the countries bordering the blue Mediterranean on the north, and separated from the scorching, arid wastes of the Sahara by the Atlas mountains and their continuations. From the foregoing, it may be inferred that the sparrowhawk has a very wide and extensive area of distribution.

These birds commence to build their nests during the month of April, at which time they may be seen soaring high in the heaven over the site they have chosen. It may be that a deserted nest of some magpie (*C. pica*), or other of the Corvidæ is chosen. If necessity demands it is repaired. The nest is situate on some branch, midway up the tree, and is formed by twigs and small parts of pine and larch, often with the unopened buds still green and fresh, as though recently broken off. It has a slight hollow in the centre, lined perhaps with a few dead leaves, or there may be no lining. Sometimes it is very large and cumbrous; while, on the contrary, others are so small, and the twigs so scanty, that the blue sky may be discerned through them, leading one to suppose, that they at times take possession of the nests of wood pigeons. If the wood be extensive, there would probably be more than one pair of these birds in it. I have known three different nests to be within a distance of fifty yards. If not molested, they will frequent the same neighbourhood year after year. When it nidificates on the shore cliffs, it takes possession of the nest of some Kittiwake or other gull, and the nest will then consist of seaweeds and such like material. The vicinity of this bird's haunt is apparent, the remains of birds, scattered feathers and pellets being as a rule found in profusion, evident tokens of its sanguinary meals.

The eggs are four or five in number, of a round form, about the size of a large plum. They have a bluish-white ground, spotted here and there with reddish-brown spots; in some very faint and indistinct, but in others the markings stand out clear, and in well-defined relief. In some the spots become large blotches of a rich reddish-brown, which gives the egg an extremely fine appearance. There is also a rare variety, which has a large blotch on either end, covering it like a cap, and a still rarer variety is that with a band or zone of richly coloured blotches encircling the egg. I have one in my collection which was taken out of Lancashire, in which the ground colour cannot be perceived, the egg being clouded with a light chestnut colour. This is the nearest approach to a kestrel's egg which I have ever seen. When recently taken out of the nest, the markings of this bird's egg may be washed off when water is applied. When the nest is robbed of its eggs, it is not invariably forsaken. I myself took two eggs out of a nest, and on visiting it during the succeeding week, found three other eggs. A more remarkable occurrence of the nature, I mentioned in this periodical some time previous, when no less than five different sets were taken from one nest.

When the eggs have been hatched, both birds appear to increase in their savageness of disposition, and show their emotions by flying round when the intruder is sacking their home, uttering piercing cries, and at times will not hesitate in attacking the aggressor. It is at this period when so much nutriment is required. Both birds are actively employed during the day in reconnoitring the contiguous country to supply their voracious family. Many are the cries loudly uttered, proceeding from the depths of the nest, as either of the parent birds are descried sailing towards its hungry progeny with a delicious morsel, the result of its forage. At this period, the time of incubation, they become extremely daring, and many are the incursions they make into forbidden territories. In their eagerness to feed their young, by their instinctive parental emotions, which are strong within them, by their impulsion to provide their family with food, they throw off for a time their habitual retirement, and bring themselves into closer intercourse with the abodes of men. Where vigilance is lax, the loss of a young duckling, or the absence of a chicken, informs the careless housewife that the "sparl hôk" has paid her a visit.

The unceasing exertions made by these birds to supply their young with an adequate sufficiency of food, testifies that, despite the naturally savage tendency of their temperament, they lack not in their innate, instinctive affection for their young.

Like other predatory birds, the "pigeonhawk" has the power of ejecting, in pellets, indigestible portions of its meals.

So familiar is this bird, that a brief description will suffice. The female is between fourteen and fifteen inches in length, while the male is but twelve. The

upper parts are brown, the wings being of a deeper tint; the tail is greyish-black, crossed by darker bars. The neck and breast are almost an immaculate white, becoming a dirty yellowish-white under the belly, which is irregularly marked with dark arrowhead like marks. The cere is yellow, the bill blue, becoming black towards the point, the legs and feet of a brilliant yellow, and the long talons are black.

"FRIENDS IN COUNCIL:" A LIST OF ASSISTING NATURALISTS.

THE persons mentioned below have signified their willingness to gratuitously assist learners of natural history and others, personally when practicable, otherwise through the post. It is, however, to be distinctly understood that this list is not intended to include professional naturalists *only* or chiefly, but all lovers of nature who have any knowledge of the subject. Additional names will be gladly received by me and inserted in a supplementary list. This index will show a visitor to any of the undermentioned places to whom he may apply for assistance in studying its natural history. Any one finding a specimen, of which he desires to know the name, may forward it to one who makes such objects his speciality, &c. In using the list it is suggested that those who write for information should enclose addressed post-card or stamps for reply. Before sending specimens of any value, it will be well to ascertain whether the correspondent is willing to return them; if so, sufficient stamps to prepay return should be annexed. When sending fragile objects the address may be written on a *separate* linen label, to obviate their being crushed under the post-office stamp. As Messrs. Kelly remark in the London Post-Office Directory, "'Esquire' should be added to the name of every gentleman to which no inconsistent addition is affixed." Please acquaint the Editor with any change of address, in order that it may be notified in SCIENCE-GOSSIP.

Tapton Elms, Sheffield. BERNARD HOBSON.

BEDFORDSHIRE.

Luton. J. Saunders, 47 Rothesay Road. *Botany, Geology*, particularly plants and fossils of Cretaceous strata.

CHESHIRE.

Frodsham. James F. Robinson. *Mosses, Fungi, or other plants.*

CORNWALL.

Falmouth. J. S. Ilsley, 6 Trevethen Terrace. *Botany, Geology;* local plants, marine animals, rocks and fossils exchanged for non-local rocks and fossils.

DEVONSHIRE.

Kentisbeare, Cullompton. Rev. W. Downes, F.G.S. *Geology.*

DORSETSHIRE.

Blandford. Rev. O. P. Cambridge, Bloxworth Rectory. *Arachnida.*

DURHAM.

Hartlepool. C. O. Trechmann, Ph. D. *Rocks, minerals*, especially *crystals.*

West Hartlepool. Robert Morton Middleton, jun., Fountain House. British and North American *Botany, Mammals, Birds* and *Reptiles.* John E. Robson, Bellerby Terrace, *Entomology*, especially Macro-Lepidoptera.

ESSEX.

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KENT.

Rochester and Chatham. Dr. J. Henry Morton, Pres. Rochester Nat. Soc. *British Flora*, especially *Phanerogams, Microscopic* mounting, General *Natural History.*

Tonbridge. Miss Edith Thomson, Judde Place. *Botany, Conchology, Microscopy.*

LANCASHIRE.

Manchester. James Walkden, 183 Broad Street, Pendleton. *British Coleoptera.*

Urmston, 5 miles from Manchester. Thomas Armstrong, F.R.M.S., Highfield Bank. *Microscopy.*

NOTTINGHAMSHIRE.

Nottingham. C. J. A. Crawley, High School. *Botany*, chiefly Phanerogams, *Geology, Mineralogy.*

OXFORDSHIRE.

Oxford. G. C. Druce, F.L.S., 118 High Street. *Phanerogamic Botany.*

Witney. W. H. Warner, Standlake. *Zoology.*

SHROPSHIRE.

Parville, Wellington. Robert Anslow. British *Flowering Plants, Mosses and Hepaticæ.*

Shrewsbury. William Phillips, Canonbury, Kingsland. Hymenomycetes, Discomycetes, Myxogastres (*Fungi*). Specimens to be freshly gathered, carefully packed, not to be returned.

SURREY.

London. Thomas B. Linley, 88 Blackfriars Road, S.E. *Geology.*

London. B. Daydon Jackson, F.L.S., F.R.M.S. Memb. Soc. Roy. Bot. de Belgique, 30 Stockwell Road, S.W. *Botany*, especially its early literature.

SUSSEX.

Eastbourne. Miss Annie Woodhouse, Rutland House. *Flowering plants.*

Hastings. R. Leonard Hawkins, Hillside, Cornwallis Gardens. Fresh-water *Algæ;* will gratuitously mount slides, *i.e.*, *one* of a specimen; correspondent to furnish material.

WESTMORELAND.

Kendal. J. S. Metcalfe, 55 Highgate. *Botany, Ornithology.*

WORCESTERSHIRE.

Hales Owen, 7 miles by rail from Birmingham. George T. Harris, Spring Villa. *Botany.*

Malvern Link. R. F. Towndrow, 2 Commercial Buildings. *Botany, Entomology.*

North Malvern. Arthur D. Melvin, Ashford Cottage. *Botany.*

YORKSHIRE.

Saltaire, 3 miles by rail from Bradford. Henry T. Soppitt, 2 Bromley Street. *Botany.*

Scarborough. George Massée, Biological Laboratory, Oak House, Oak Road. *Flowering Plants,* Microscopic *Fungi.*

Selby, 12½ miles by rail S. of York. W. N. Cheesman, Hon. Sec. Selby Nat. Soc., The Crescent. *Botany, Microscopy.*

Sheffield (2 miles from), George Robert Vine, 112 Hill Top, Attercliffe. Recent and fossil *Polyzoa,* Microscopic structure of *coal plants.* G. R. Vine, Jun. (same address). Recent and fossil *Foraminifera.*

Sheffield. James E. Westby, 42 Spooner Road, Broomhill, *Geology.* Bernard Hobson, Tapton Elms, *Phanerogamic Botany;* will return specimens if desired.

Thirsk, 9 miles S.S.E. Northallerton. William Foggitt, Market Place. *Phanerogamous Plants.*

WALES.

Merionethshire, Dolgelly. Owen Reese, Meyrick Square. *Geology.*

SCOTLAND.

Co. Roxburgh, Kelso. Andrew Brotherston, Shedden Park Road. *Botany.*

IRELAND.

Co. Antrim, Belfast. Thomas Workman, Bedford Street. *Spiders.*

Co. Clare. Gortaclare, Burren (nearest station Gort, Co. Galway), Terence McGann. *Botany, Microscopy,* mounts slides, supplies micro material, algæ and living plants on exchange, &c.

Co. Dublin. Lucan, 6¾ miles by rail from Dublin. Joseph Edward Palmer. *Ornithology.*

SOUTHERN GERMANY.

Baden-Baden. Max Leichtlin, proprietor of *Botanic Garden,* Station for introducing new and rare plants.

A list of *Entomologists* by H. T. Stainton, F.R.S., occupies first fifty-five pages of "Entomologists' Annual" for 1860, pub. Van Voorst, 2*s.* 6*d.*

OUR COMMON BRITISH FOSSILS, AND WHERE TO FIND THEM.

No. IX.

By J. E. TAYLOR, Ph.D., F.L.S., F.G.S., &c.

PERHAPS no fossils have such a geological value as corals. If the extinct species were marked by the same habits as their modern representatives (and in many cases the families of living corals are so ancient, and the extinct forms glide so imperceptibly into existing kinds that there is no absolutely strongly-marked line of division), then their value to the physical geologist who endeavours to restore the conditions of primeval seas is immense. For coral-animals can only flourish where the sea-water is clear, and therefore where no muddy sediments are forming. And coral-animals are easily separable into two groups—the single and simply compound corals, which are usually inhabitants of deep water; and the reef-building corals which cannot live and flourish beyond the depth of twenty-five fathoms. Moreover, coral reefs indicate to the physical geographer slowly subsiding areas of the sea-floor. They are also indicative of a certain degree of ocean temperature, for we do not find them where the sea-water is cooler than 62°, and therefore the sub-tropical belts of our globe now roughly comprehend their distribution. But we find fossil corals simple, compound, and reef-building. They are characteristic of many thick limestone formations, from the Silurian upwards. We have fossil reef-building corals where their modern representatives could not now live. What climatal changes do not these valuable fossils indicate! Not less important are the condition of the ancient seas they lay before us. We carry our minds back to when coral islands, fringing-reefs, and barrier-reefs were in British seas. These reefs also tell the geologist of the adjacency of land, and inform him of the fact that the sea-floor was in a state of subsidence.

Moreover, few fossils are prettier, more easily procurable, or look better in the cabinet, than corals. They are found in nearly every limestone formation which was originally deposited in the sea. No other fossils can be so well studied, cut into sections and examined under the microscope. And they are so very abundant that the limestone walls in the hilly districts where Silurian, Devonian, Carboniferous, or Oolitic limestone crops up, are often composed of little else than blocks of fossil coral.

We are beginning to understand the true relationship of living and extinct corals better than we did, thanks to the labours of Dr. Sorby and Mr. H. N. Mosely. Formerly these animals (classified chiefly by the stony or limy parts they leave behind), were all grouped among that order of the Actinozoa called "Zoantharia," of which the common sea-anemone is the type. The order "Zoantharia"

was split up into three divisions, called Tabulata, Rugosa, and Aporosa. It was thought that the two former were Palæozoic types of corals, and the third of Neozoic and Recent corals. Let us examine the fundamental difference of these three groups. The tabulate corals are remarkable, and indeed obtain the name which distinguishes them, for the floors which seem to horizontally split them up into so many stories. They are compound corals, whose shapes are modified by the manner in which they grew, so that some are polygonal, or many-sided, and others oval or round. The most remarkable of these tabulate fossil corals are Heliolites, Favosites,

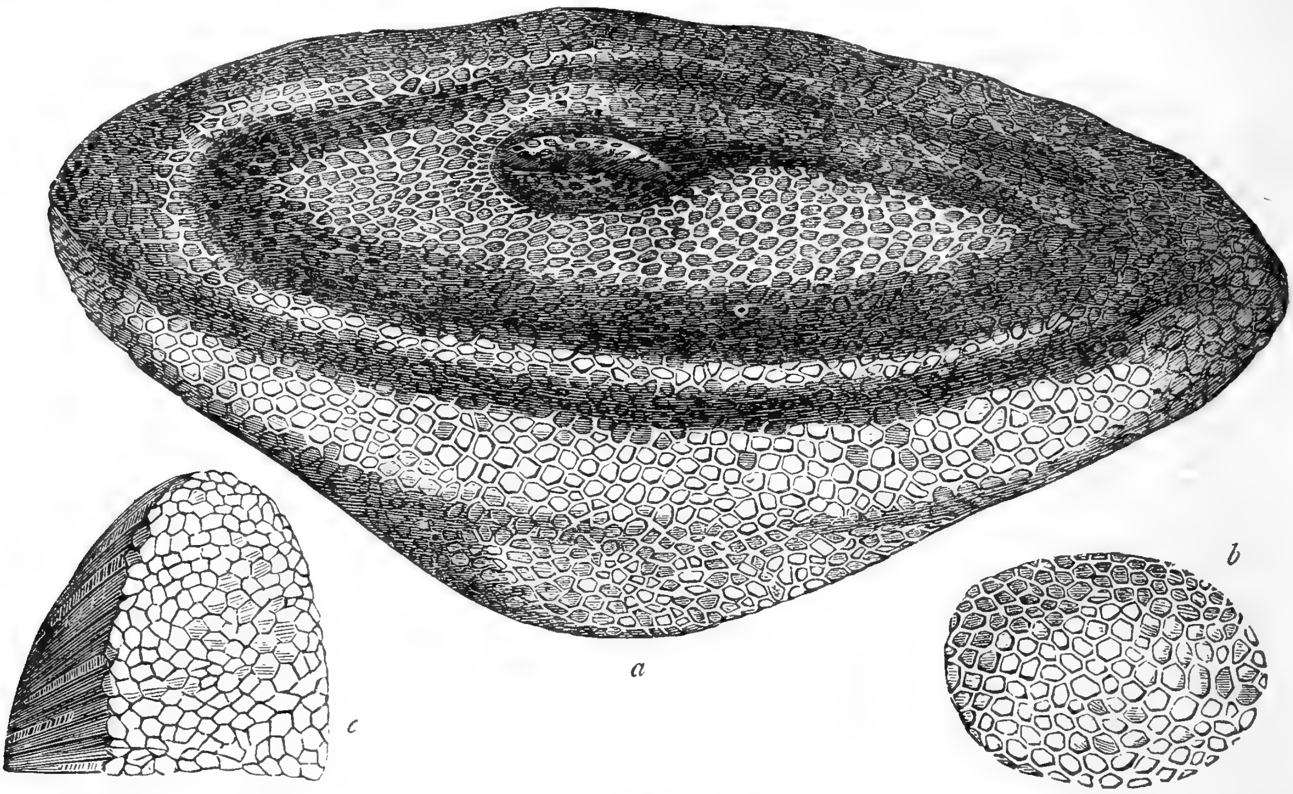

Fig. 197.—*Favosites Gothlandica.* A Silurian and Devonian Coral (complete specimen); *b*, young specimen; *c*, section showing the polygonal tubes.

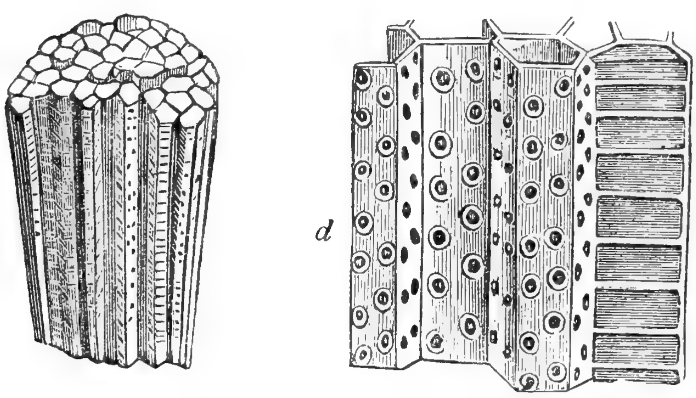

Fig. 198.—*Favosites Gothlandica, e* cluster of tubes of Favosites; *d*, tubes (magnified), showing tabulæ and perforations connecting the tubes.

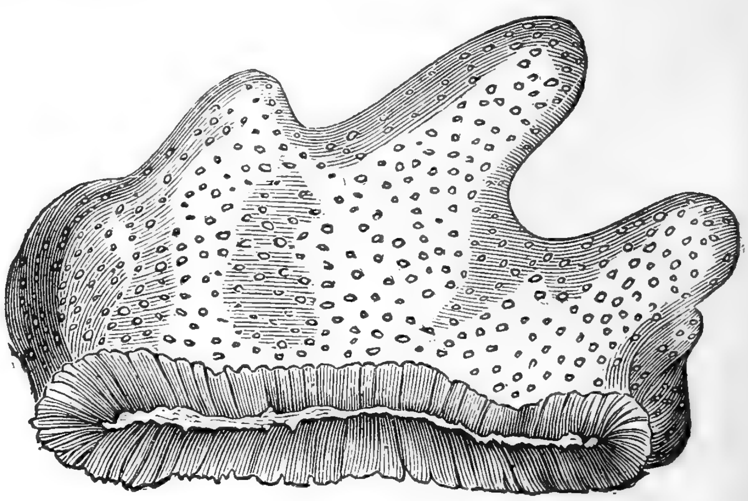

Fig. 200.—*Heliopora cærulea.* Recent Alcyonarian Coral.

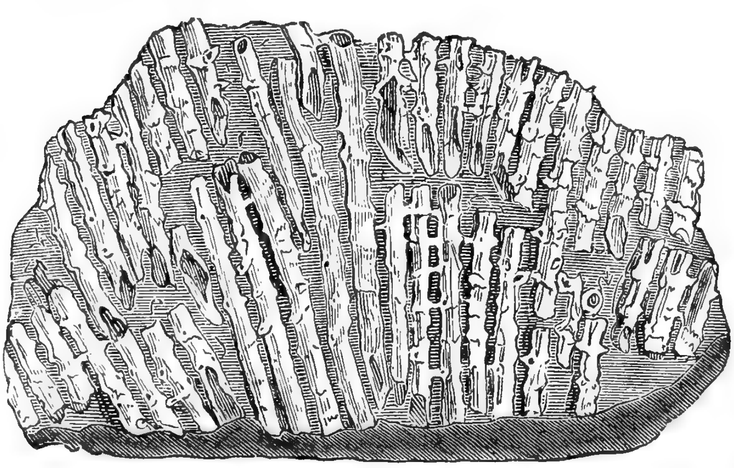

Fig. 199.—*Syringipora ramulosa.* Carboniferous limestone formation.

the pretty "chain-coral" (Halysites), Syringipora, &c. It will be seen from fig. 198, which shows a magnified section of a very abundant Silurian coral (*Favosites Gothlandica*), that the coral-tubes—as we may call them—are separated into horizontal chambers. The walls are perforated, as they are in some of the Alcyonaria, possibly for transverse canals. It will also be seen that the interiors of the corals are *not radiated*—that is, have not these vertical plates springing from the walls which are called *septa*, or if they are present in *tabulate* corals they are very feebly marked. This general absence of septa is the leading distinction of tabulate corals. Mr. Mosely thinks that most if not all of this group are in reality not Zoantharians, or *true* corals, but Alcyonarians, of which the common organ-pipe coral (*Tubipora musica*) is the best example. Some

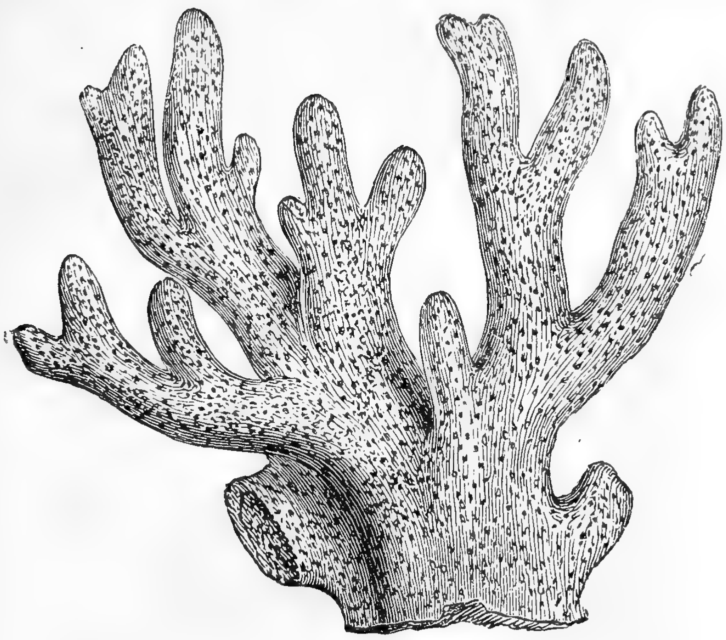

Fig. 201.—*Millepora alcicornis.* A recent Hydrozoan "Coral," Bermudas.

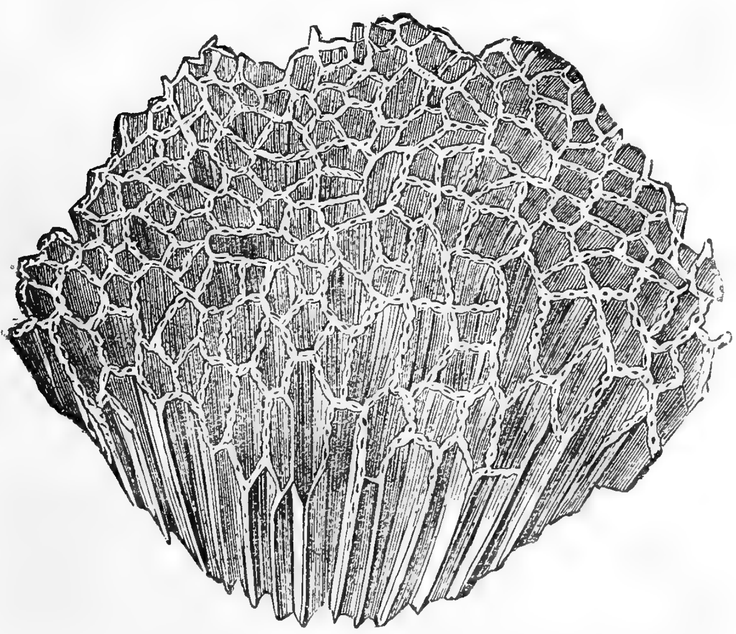

Fig. 202.—Section of "Chain-Coral" (*Halysites catenulatus*), showing tubes. Upper Silurian formation.

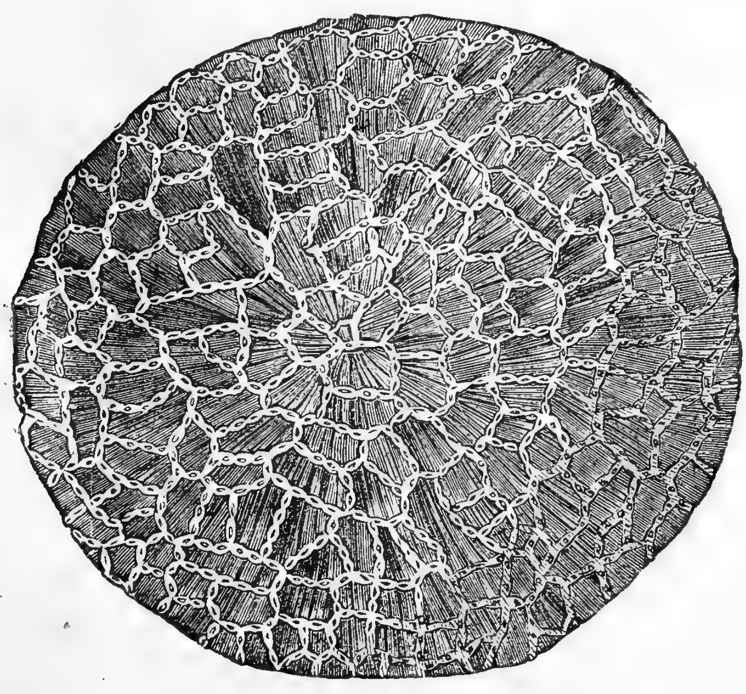

Fig. 203.—"Chain-Coral" (*Halysites catenulatus*).

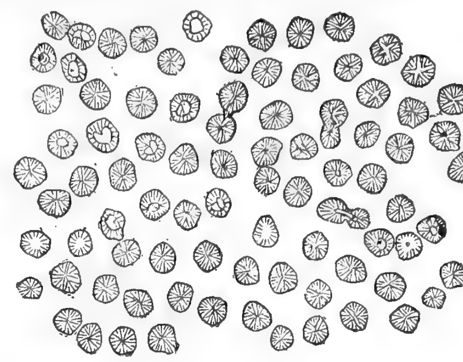

Fig. 204.—Horizontal section across block containing *Lithostrotion junceum.* Carboniferous limestone.

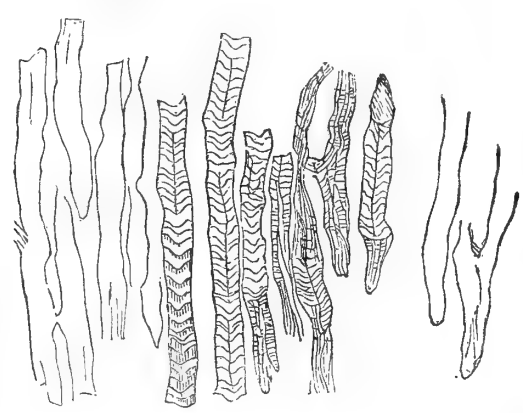

Fig. 205.—Vertical section of *Lithostrotion junceum.*

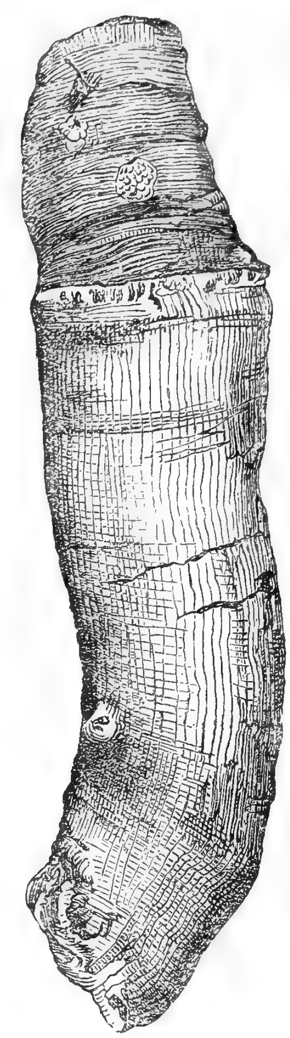

Fig. 206.—*Amplexus coralloides.* Carboniferous limestone.

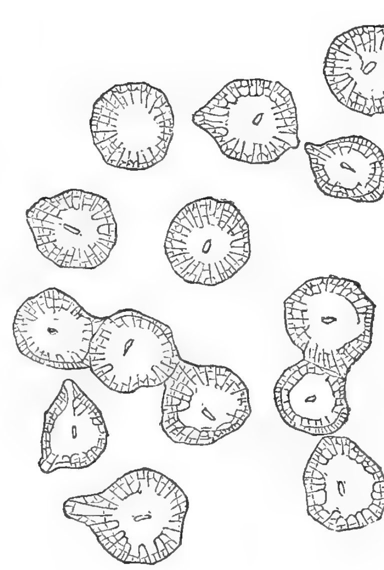

Fig. 207.—Horizontal section of *Lithostrotion Phillipsii.* Carboniferous limestone.

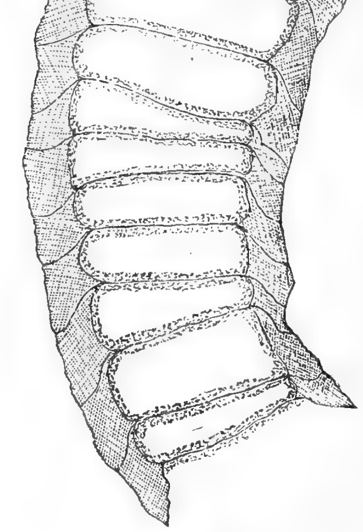

Fig. 208.—Vertical section of *Amplexus coralloides,* showing the tabulæ.

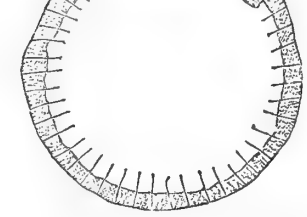

Fig. 209.—Horizontal section of *Amplexus coralloides,* showing feebly developed septa.

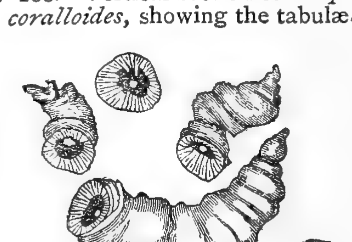

Fig. 210.—*Cyathaxinia.* Carboniferous limestone. A, Horizontal section.

of the so-called corals, as the Millepores, he has proved to be not corals at all, but that they actually belong to the Hydrozoa. He has shown that there is a peculiar division of labour in the polyps of modern Millepores, some of the zoophytes catching the food and others digesting it, after they have received it from the catchers. This is the case in Stylaster, where the food-catching zoophytes very much resemble the tentacles arranged round the mouth of the common sea-anemone.

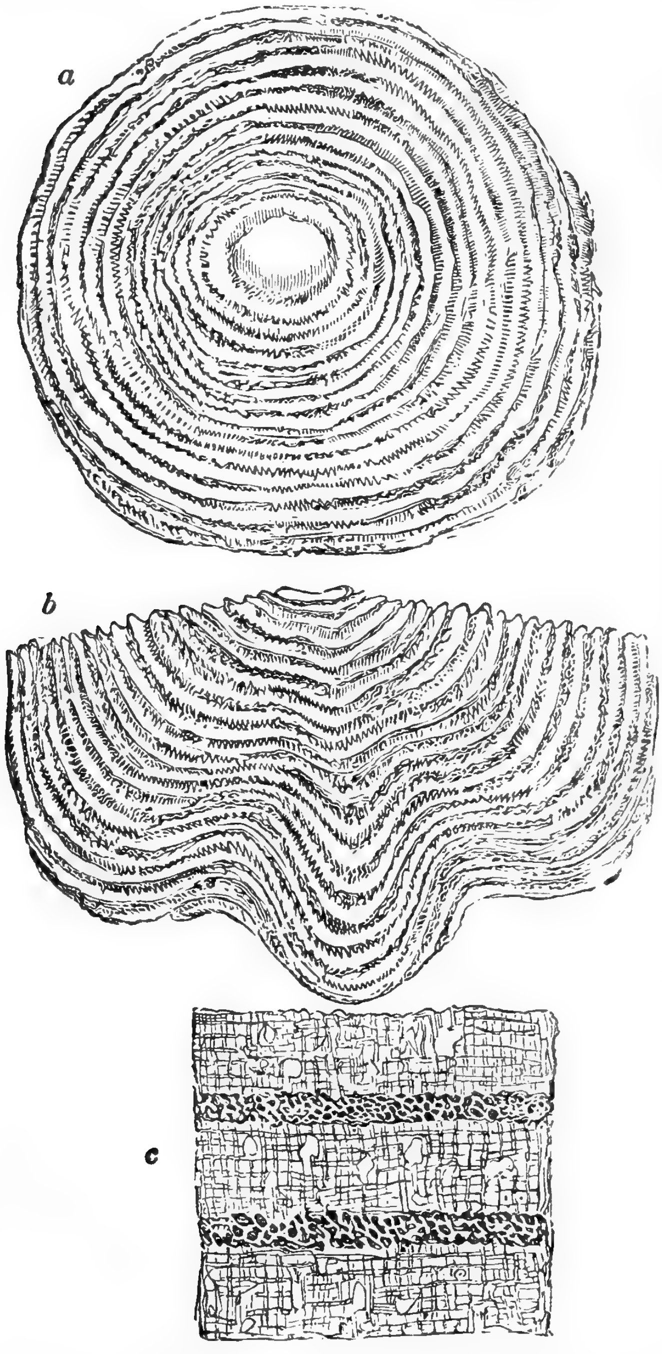

Fig. 211.—*Stromatopora concentrica* (Upper Silurian and Devonian formation), now believed to be a calcareous sponge; *a.* surface of fossil; *b,* vertical section; *c,* portion of *Stromatopora concentrica* magnified.

The abundant recent coral *Heliopora cærulea* (whose specific name comes from the bright blue colour of the stony structure, which is usually white) is an Alcyonarian, more nearly allied to some of the sea-fans than to true corals. It is plentiful in equatorial seas, and especially off the Bermudas. It has not indistinct traces of septa. The Heliolites so abundant in the Silurian and Devonian limestones, do not differ in any important particular from the living Heliopora, and like it they no doubt belonged to the Alcyonaria.

The division called Rugosa, on the other hand, is distinguished by well-marked *septa,* radiating from the coral walls towards the centre, in the pretty star-shaped fashion which caused Cuvier to group these creatures along with other similarly star-rayed in their shapes, into the sub-kingdom Radiata, now no longer accepted by naturalists. In this radiated structure, therefore, the Rugose corals resemble the Aporose corals. But whereas the Tabulate and Rugose corals (with few exceptions) are limited to Palæozoic rocks, the Aporose corals are peculiar to those formed since then. Again, the septa, or radiating ridges, of the Rugose corals are always in multiples of *four;* whilst those of Aporose corals are in multiples of *six.* Besides this means of distinguishing the Aporose corals from any of the others, the fact that they never have tabulæ—that is, are never divided into horizontal layers—is another important distinction. When the tabulate corals have faint traces of septa, we can see they are also in multiples of four, and they thus show their structural relationship to the Rugosa. Dr. Sorby has shown that the tabulate corals are built up of Calcite, whilst the Neozoic and modern corals are formed of that limy structure known as Arragonite. It may be that the Rugosa are descended from the Tabulata, which would at once make clear why the tabulate corals appear in such numbers of species and in individuals in the Silurian and Devonian seas. In the Carboniferous rocks the most numerous corals are the Rugose kind, in which the radiated structure is very plainly visible, as in *Lithostrotion junceum,* &c., of which we give illustrations of the transverse appearance they present when cut and polished. For some of our illustrations we are indebted to Mr. James Thomson, F.G.S., of Glasgow—one of the most enthusiastic and diligent students of Palæozoic fossil corals in Europe. The numerously represented fossils called Stromatopora (fig. 211)—so abundant in our Silurian and Devonian limestones (in the latter, about Plymouth and Torquay so plentiful that rock-masses are composed of them alone)—are now believed to be Calcareous sponges, or sponges whose abundant limy spicules amalgamated into the concentric rings which are characteristic of their structure. The student may study this structure in any polished mantel-piece formed of Devonian marble from the quarries of Newton-Abbot and the neighbourhood. By far the prettiest of the Palæozoic fossil corals are those belonging to the Rugosa, such as Strombodes, Cyathophyllum (perhaps the most plentiful of them all), Cyathaxinia (a simple coral), Lithostrotion, Lithodendron, &c. Perhaps the true simple coral which may be regarded as the simplest in structure is Amplexus, and there is reason for believing that many more elaborate fossil corals pass through a kind of Amplexus stage.

We shall have to devote separate articles to generic descriptions of fossil corals, and localities where they are most abundant.

THE HISTORY OF THE APPLE-TREE.

By H. G. Glasspoole (*concluded*).

THE apple belongs to the natural order of the Rosaceæ, of which the rose is the type or head of the family.

In Britain it is found in a wild state in the hedges and on the margins of woods as far north as Morayshire, and as high as the agricultural zone. Wherever it occurs in a wild state, the tree when young is generally furnished with thorns, but these disappear as it advances in age. The tree is of moderate size and spreading, the branches more horizontal than those of the pear. It is stated that the apple-trees introduced into the Sandwich Islands have entirely changed their habit of growth, and send up long vertical and almost branchless shoots.

Apple-wood is fine grained, hard, and compacted. It is used for turning and for many other purposes where hardness and variegation of colour are objects. The tree is very tenacious of life; many are known to bear fruit at the age of two hundred years. One of the most beautiful sights in the country during a fine May is to see an orchard filled with apple-trees arrayed with white and rosy blossoms, the delicate fragrance of which is "less than roses and more than violets." Mr. Ruskin, that great observer of nature's varying beauties, remarks in one of his works, "that of all the lovely things which grace the springtime of this fair temperate zone, I am not sure but the blossoming of the apple-tree is the fairest."

The fruit of the apple contains sugar, malic acid, mucilage, vegetable fibre and some aroma on which their peculiar flavour depends; the sugar is similar to that found in the grape, and differs from the sugar of commerce in not being crystallizable. Malic acid is found in strawberries and other summer fruits; it is largely used in the art of dyeing cotton goods, &c. When the fruit decays, the sugar is changed into a bitter principle and the mucilage becomes mouldy and offensive. Heat when in cooking tends to break down the interstices of the cells of the pulp, diffuses the acid and sugar more uniformly through the mass, and renders the whole more easy of digestion. The juice obtained from the wild crab is called *verjuice* and is applied externally for sprains, cramps, &c.

The derivation of the word apple is curious. In Saxon, *appl*, *appul;* German, *Apfel;* in Welsh, the *aval;* this word primarily signifies fruit in general, especially of a round form, as in Welsh not only apple but plum and other fruits. Aval melynhir, a lemon; aval euraid, an orange. Dr. Prior remarks that in all Celtic and Slavonic languages the word is (with the allowance of dialect) the same, and it is the only one for which we have a name that is not derived from the Latin or French. Dr. Prior tells us the meaning of the word is unknown. It is very possibly from Sanskrit *amb*, "eat," and *phul*, "fruit," but as *ap* is in Zend and Sanskrit "water," we might be tempted to believe that it originally meant water-fruit or juice-fruit with which the Latin pronoun from *poto*, "drink," exactly tallies. (See Prior's "Names of British Plants.")

In former days the apple occupied an important place in the sports and superstitions of our forefathers, some of which survive, even to the present day, among the rural population of our villages. On St. James's Day, before the Reformation, the Catholic priests were accustomed to bless the apple-trees and commend the fruit to the saint's protection in terms of a formal prayer and benediction, still preserved in the Sarum Manual. There is also an old saying that when it rains on St. Swithin's Day it is the saint christening the apples. In Devon and Herefordshire it was the custom on Twelfth Night to salute the apple-trees in the orchards, hoping thereby to obtain a good crop next season. The ceremony consisted of taking a wassail bowl of cider with toast in it, and pouring the liquor about the roots of the trees, and hanging bits of toast on the branches of the most barren, the rustics dancing round in a circle singing:

> "Health to thee, good apple-tree,
> Well to bear, pockets full, hats full,
> Pecks full, bushels bags full."

Another custom is apple howling, which takes place about Christmas. A troop of boys visit different orchards blowing a cow's horn, and encircling the trees, rap them with their sticks, as they repeat the following words:

> "Stand fast root, bare well top,
> Pray God send us a good howling crop;
> Every twig, apple big,
> Every bough, apples enow,
> Hats full, caps full,
> Good quarter sacks full."

These ceremonies are supposed to be a relic of heathenism, and were first instituted as a sacrifice to Pomona. After the performance alluded to above, the boys expected to be rewarded with halfpence from the owners of the orchards.

That this custom was practised in Sussex we learn from the Journal of the Rev. Giles Moore, who writes "26 Dec. I gave the howling boys sixpence." No doubt the boys of the parish had been performing a relic of a heathen custom in the parson's orchard. Amongst the popular customs in Nottinghamshire, if a girl had two lovers, and wished to know which would be the most constant, she procured two brown apple-pips, and having named them after her lovers, stuck one on each cheek, the first that fell off was instantly discarded as being unfaithful. It is to this custom that Gray alludes in his spell:

> "See from this core two kernels now I take,
> This on my cheek for Lubberkin is worn,
> And Booby-Clod on t'other side is born.
> But Booby-Clod soon falls upon the ground,
> A certain token that his love's unsound;
> While Lubberkin sticks firmly to the last,
> Oh were his lips to mine but joined as fast."

See Brand's "Popular Antiquities" and Thiselton Dyer's "Customs" for further details on this subject.

In Servia when a person is suffering from consumption and the efficacy of ordinary simples has failed, the babas, or doctor, takes three apples which grew upon the same branch to represent the Trinity ; a knife is driven into one of these and left there twenty-four hours, and then the apple is given to the patient to eat, after which, in desperate cases, the patient is stretched on his stomach on the ground, and the babas strews salt around him, and then strides several times over him from right to left, making mysterious signs and muttering formulas that are reputed to be sovereign remedies.

The saying "To have everything in apple pie order" is supposed to have its origin from the following circumstance. It was the custom many years ago to take off the top crust of an apple pie and mash up the fruit with sugar and cream, then cut the crust into triangular pieces like soppits and stick them end downwards into the fruit in various patterns, as circles, crowns, stars, &c. (see "Notes and Queries," 3rd s. vol. vii. p. 265).

In Scotland the apple-tree is the badge of the Clan of Lamont.

MICROSCOPY.

CLEANING OLD SLIDES.—I have seen several ways of cleaning turpentine or soft Canada balsam off slides recommended, but have never seen methylated spirit named. I have used it for some time, and like it. It is clean and pleasant ; cleans fingers, knives, needles, &c., and answers well to clean slides after scraping off superfluous balsam. Thin circles, after soaking in water, can be put on glass, scraped, and finished up with spirit, being dipped in it if necessary. I recommend at least a trial of it ; a very little is enough, in many cases a drop or two.—*W. Locock, Clifton.*

MICROSCOPICAL SOCIETY OF LIVERPOOL.—The eighth ordinary meeting of the eleventh session of this society was held at the Royal Institution on Friday evening, November 7 ; the president, the Rev. W. H. Dallinger, R.M.S., in the chair. The hon. sec., Mr. I. C. Thompson, announced the following donations, viz. Beale's "How to work with the Microscope," from the president ; Pasteur's "Studies in Fermentation," from Mr. Edmunds, The Limes, Birkdale, and three slides of mineral crystals from W. H. Grattan, honorary member. Mr. Charles Botterill exhibited and explained a new form of life-slide devised by him, adapted for the examination of a wide range of objects. The advantages claimed for this slide are, the facility with which it can be used and cleaned—its reversibility, allowing either side of the object to be examined through thin glass—the provision for renewing the supply of water without disturbing any part of the apparatus, thus enabling objects to be kept under examination for an indefinite period, the same arrangement also allowing of the introduction of colouring matters, as carmine, indigo, &c. ; and lastly, its moderate cost and durability. The president, the Rev. W. H. Dallinger, made some valuable remarks, entitled "Notes on Bathybius as an entity at the base of the Organic Series," holding that Bathybius, as admitted by Huxley himself, has a very doubtful existence, and that it is not wise to bolster up an hypothesis quite capable of standing without Bathybius as an argument in its favour, seeing that the Foraminifera furnish an example of the simplest form of granuleless protoplasm, and therefore stand much lower in the scale of animal life than even the Amœbæ. The Rev. H. H. Higgins made some interesting observations on the "Plasmodium of the Myxomycetes," illustrated by diagrams. He described some researches which he and the Rev. William Banister had made upon this fungoid condition, and from which he had, after considerable patient watching succeeded in detaching a small speck which exhibited under the microscope the true amœboid form showing curiously-shaped moving pseudapodia. The Rev. William Banister followed with further observations on the subject. The meeting concluded with the usual conversazione.

RULES, &C., OF MICROSCOPICAL SOCIETIES.—As a few microscopists in Manchester contemplate forming themselves into a Microscopical Society, perhaps some of your readers would be kind enough to send us a copy of rules of similar societies for our guidance. All information on the subject will be gratefully acknowledged.—*Richard A. Bastow, 6 Dover Street, Higher Crumpsall, near Manchester.*

THE INHABITANTS OF A DROP OF WATER.—It may interest some of your readers to learn that in a single drop of water obtained from pits in the south-west corner of Hale-moss, Bowden, Cheshire we obtained the following, Vorticella, Brachionus, *Rotifer vulgaris*, Paramecium, Cyclops, Salpina, Volvox, Stentors, Epistylia, *Trachelium ovum*, Vibrio, Spyrogyra, Closterium, Navicula, Diatoms various, and a host of small animacula scarcely visible with the one inch objective which we were using ; also some larvæ and other creatures which we could not name. —*R. A. B.*

HOW TO AVOID AIR BUBBLES IN PREPARING DIATOMS IN SITU.—Thinking the following mode of preparing diatoms *in situ* perfectly exempt of air bubbles might prove interesting to some readers of SCIENCE-GOSSIP, I asked of my friend Mr. Paul Petit, of Paris, permission to send you an extract of an article which appeared under his name in the "Brebissonia" last February. The process is this :—Instead of burning at once the valves on the cover, as proposed by Mr. de Brebisson, which does not always destroy all organic matter, the gathering (of marine after several washings in fresh water) is placed in concentrated nitric acid for twelve hours ;

the object of this immersion is to ensure the entire destruction of the cellulose, when the valves after repeated washing are then burnt on the cover at a dull red heat until perfectly white. The cover being allowed to get cold a drop of oil of lavender is placed on it. Mr. Petit, after many experiments with different mediums, has found that this oil is the only one that penetrates thoroughly the valves, such as *Melosira nummularia*, *M. arenaria*, &c. A drop of Canada balsam being then put on the glass slip, the cover is placed on it and the whole warmed over the lamp to evaporate the oil of lavender and partly harden the balsam. In order to show on the same slide the different views of the valves, Mr. Petit adds to those *in situ* a little portion of the gathering prepared in the ordinary way, viz., by boiling in acid. The preparations thus obtained are perfect and most interesting.—*J. Tempère.*

ZOOLOGY.

The Guinea Pig.—As I find that no work on Natural History I have consulted gives the correct period of gestation in the guinea pig, I think it might be interesting for me to record my observations. Eighteen instances I have carefully watched, and I find, without any exception, that the time is sixty-six days. As the guinea pig breeds again on the same day that it brings forth its young, and also, as I can testify, at the early age of eighty days, this no doubt accounts for the reason why a less time for gestation has been recorded in works on Natural History than is the fact. In no instance have there been more than four at a birth.—*Frederick Gull.*

Butterflies and Coloured Nets.—At Mentone, in 1878, I was at first utterly unable to catch any specimens of the beautiful Cleopatra butterfly. I had a light net with a blue tarlatan bag and each time I missed a specimen, it flew away to a great distance. It was also very rarely that one came within reach of my net. On mentioning this to a friend, he told me he found them very easy to catch, as they seemed to follow his net, the bag of which was green. Upon hearing this, I adapted a green bag to my insect net, and found it was only necessary to wave it backwards and forwards, when one or more Cleopatras would be sure to come and try and settle on it, and were easily captured. After I had thus procured plenty of specimens, I was one day hunting for the beautiful *Anthocharis Eupheno* when a Cleopatra fluttered after my net and could not be got rid of. And yet this was in a hot lemon plantation, with the green leaves of the lemon trees above and below. Again when driving from Salerno to Palestrina last spring, I had my net with the green bag. I saw a Cleopatra flying towards the carriage, and on waving my net behind, it followed for some distance. Mr. W. S. Coleman states that *Gonepteryx Rhamni* and Cleopatra have been proved identical, since both have been reared from the same batch of eggs. The female Cleopatra does not differ visibly from *G. Rhamni* and was not attracted by green. This insect has often been labelled as a distinct species, *Gonepteryx Cleopatra*, and at the museum at Florence was labelled "*Colias Cleopatra*," while the ordinary brimstone butterfly was labelled *Gonepteryx Rhamni*, thus erroneously putting two varieties of the same species into separate genera! The male only differs from our British variety in having the fore wings nearly entirely suffused with bright orange colour instead of its being limited to a spot the size of a pin's head. Naturally therefore, as soon as possible, I tried waving my green net in a field full of the ordinary Rhamni, but none of them took any notice of it. Sometimes, when one settled, I waved my net close to it, but it either remained where it was, or else invariably flew right away. Why one variety of a butterfly is attracted by green, and the other with which it is identical should pass it by unheeded, seems to me wholly incomprehensible. It would however be highly interesting if any of the readers of Science-Gossip who had the opportunity were to try whether this beautiful variety is attracted by any other colour (say yellow), or to notice whether any other insects are attracted by certain colours in a similar manner.—*G. H. Bryan.*

The Fauna and Flora of the Cuckmere District.—Mr. F. C. S. Roper's last paper read at the Eastbourne Natural History Society was a very important one, dealing with the additions to the Fauna and Flora of the above district during the past year.

"The Fauna of Norfolk."—This well-known book, written thirty years ago by the Rev. Richard Lubbock, M.A., now appears as a new edition published by Jarrold & Co.: London and Norwich. In addition to the intrinsic merits of the book, of which we can personally speak in the superlative degree as one of the most pleasantly written of the many pleasant natural history books our language is so rich in, describing as it does the "Broad District"—a country unlike any other part of England, and a very paradise to the botanist, entomologist, and ornithologist—this new edition is edited by Mr. Thomas Southwell, the active secretary of the Norfolk and Norwich Naturalists' Society, whose full and accurate knowledge of the natural history of Norfolk better fits him for the task than any other man we know of. The memoir of Mr. Lubbock is written by Henry Stevenson, F.L.S., author of the "Birds of Norfolk," and Professor Alfred Newton contributes an appendix on Hawking in Norfolk, &c. Many other naturalists, such as Mr. J. H. Gurney, Mr. C. G. Barrett, Dr. Lowe, of Lynn, Mr. H. D. Geldart, &c., have also contributed notes or other assistance. We are glad to see an old and valued friend appearing in such good company.

BOTANY.

THE TOURIST'S FLORA.—In the September number of SCIENCE-GOSSIP, Bernard Hobson, in his enumeration of choice books on Botany, mentions the "Tourist's Flora," by Joseph Woods, F.A.S., F.L.S., F.G.S. It is stated to be a descriptive catalogue of the flowering plants and ferns of the British Islands, France, Germany, Switzerland, Italy, and the Italian Islands. Reeve, Benham, & Reeve, 1850. This book, until I ceased taking my annual botanical excursions abroad, was for twenty years my constant companion in the middle and south of Europe; it was most useful, as containing a brief, plain, and concise description of all plants within the limits above mentioned. In his introduction, the author says the work has no pretensions to originality, but gives a description from the works of different botanists, making it clear and distinctive, and at the same time, condensing the whole as much as possible, so as to be comprised in a single volume, of a bulk not inconvenient for the use of the travellers. The first eighty-two pages give the genera according to the Linnæan System. He says the characters of the natural order are so little definite, that it is almost impossible for the student to determine a plant by them. He has therefore thought it best to give a *clavis analytica* of the Linnæan system, and follow it in the arrangement of the genera by giving a reference to the species in the arrangement of the natural orders (containing 434 pages) with a copious index. The work is not elementary, but to a travelling tourist who has made some proficiency in botany, will be found of the greatest assistance, and quite portable. The book is, I understand, out of print; but I am assured that, from the numerous applications, a new and improved edition would meet with a ready sale to the constantly increasing number of English travelling botanists; and especially if the authors' names were added. The two systems being comprised in the same work, will enable the reader to select the one he finds most convenient in finding the genera and species.—*T. B. W., Brighton.*

DAUCUS CAROTA.—As a geologist, I am rather out of my element in botany, and hesitate to express an opinion upon the latter subject; but to those who, like myself, are but beginners, are not the descriptions which we find of the above-named plant in elementary books of botany, somewhat misleading? According to every book which I have yet seen, we are taught to consider the central red floret a reliable distinction. Yet surely this is not the case. Not only do the red petals often early drop off—but often no red florets are to be found on the plant when perfect. I have compared a good many specimens lately. Once, having pulled up a well-charactered specimen, I turned it upside down to examine the root, and on replacing it in a natural position *all* the red florets, three in number, were gone. Other specimens, differing in nothing else but the central floret, had a single large white floret, in the centre of the side of the outer florets of the outer umbels. Others had single florets of every shade of pale pink, even so pale as scarcely to be distinguished from white. Others had partial umbels in the centre with two, three, or even four *small white* florets. The roots of all had the same carroty smell when bruised. The locality is sixteen miles from the sea, so that I could not have found *D. maritimus*. One half of these specimens were till lately supposed by myself and others to be wild parsnip or other umbellifers, from which they differ in growth, foliage, inflorescence, and habitat.—*W. Downes.*

GEOLOGY.

A MUSEUM FOR STAFFORD.—We hope the day is not far distant when every town will have a museum of natural history. Mr. C. L. Wragge, of Cheadle, has just presented to the town of Stafford a fine collection of geological, ethnological, and natural history specimens, collected in various parts of the world, and we hope it will prove the nucleus for a good museum.

RHINOCEROS TICHORHINUS.—A specimen of the head of this extinct animal has just been placed in the St. Petersburg museum. It is well preserved, and still covered with patches of hair. It is part of an almost complete carcase which has been preserved in the frozen state, like that of the well-known mammoth, whose hair and eyeballs are in the same museum, and it comes from the banks of a tributary of the Yena.

"THE CARBONIFEROUS LIMESTONE and Cefn-y-Fedw sandstone of the country between Llanymynech and Minera, North Wales." Under this somewhat uncouth title, Mr. George H. Morton, F.G.S., the Hon. Sec. of the Geological Society of Liverpool, has written a capital monograph of the geology of the most interesting part of the lower carboniferous formation of North Wales. A good deal of the matter has already appeared in the proceedings of the Liverpool Geological Society, but it is very pleasant to be able to read the description in the present unbroken fashion. Mr. Morton has for years past made the district in question the scene of his summer rambles and investigations. This handsomely got-up little volume bears abundant marks of good work. It is illustrated by an excellent large photograph (as a frontispiece) of the outcrop of the carboniferous limestone of Craig-yr-Ogof, and two others of a smaller but full-page size, of the most important natural sections, as well as thirteen woodcut illustrations of quarries and sections. We congratulate Mr. Morton on the excellent way in which he now presents his labours to the geological world. The work is published by David Bogue, 3 St. Martin's Place, London.

NOTES AND QUERIES.

Intelligence in Animals.—The following may, perhaps, be of interest, as affording another striking instance of intelligence in animals. Last autumn a friend of mine residing at Torrington, Devon, stored away in a cupboard under a flight of stairs two dozen strong glass bottles of "home brewed" ginger wine, laying the whole of them on their sides. A few weeks afterwards the family was alarmed, night after night, by hearing strange and unaccountable sounds after all had retired to rest. Long-forgotten stories of haunted houses began to obtrude themselves on the recollections of the inmates, and, the noises continuing, the whole family became seriously alarmed. At length the mystery was cleared up. One of the family, having to go to the cupboard in which had been placed the bottles, discovered that all the wine, with the exception of one bottle-full, had disappeared, the thieves having broken most of the bottles and left the fragments of the glass scattered about on the scene of the debauch. On closer examination, all the corks were found to be more or less gnawed, and a rat-hole was discovered at the back of the cupboard. A trap was at once set, and any doubts as to the thieves were soon removed by the capture of a large rat. How the animals could have broken the bottles, all of them being laid on their sides on the floor, remains a mystery. The only way seemingly to account for it is, that on discovering the contents of the bottles, the rats had the intelligence to roll one against another, until they succeeded in effecting their object. —*George M. Doe, Torrington.*

Intelligence in Man and Animals.—The question is not whether reason and instinct are one and the same thing; but whether the intelligence of animals is the same in kind, and differs only in degree from the intelligence of man. There is a very great difference between reason and instinct: reason is a faculty dependent on instruction and experience, and instinct a natural impulse independent of instruction and experience, and I am driven to the conclusion that reason, not only exists in animals, but instinct in man; in other words the same intelligence is common to both, the difference being merely one of degree. The mind of a child has been compared to a blank sheet of paper, and this is a fair comparison: but he who invented the simile failed to see traced in sympathetic ink upon the blank paper a beautiful design, and so when circumstances and those around trace upon it their design, the moist colouring serves to reveal the latent colours too, and the two designs become blended and inseparable: and thus it is often difficult or even impossible to say if a precise action is instinctive, or prompted by reason (i.e. is the result of instruction or experience); but once grant the existence of this latent tracing and instinct in man is a necessary corollary. The passion for drink need not be adduced. Are not genius and intuition nearly akin to instinct? Is not the boy poet, the child who draws as soon as it can hold a pencil, but examples of deep instinctive feeling! "Some men," says the writer of "Ecce Homo," "seem to attain truth by an intense stare," and he instances Carlyle as an illustration. The illustration becomes doubly instructive when Mill in his autobiography mentions the same thing, how Carlyle as a poet saw things instantly, while he (Mill) was obliged painfully to argue up to them. Instances plainly showing animals are endowed with reason are so common that I need not cite any, but I would ask those of your correspondents who disagree with my conclusions if they have never seen a dog perplexed and cogitate for some time before acting? It affects the general question but little to cite isolated cases; animals may reason, though chicken peck up as soon as they are hatched, just as men reason, though as children they once sucked their mothers' breasts. Mr. H. D. Barclay talks about moral faculties and abstract reasoning as if he were comparing the intelligence of an average Englishman with the intelligence of a spaniel or water-hen. But the comparison must be a very different one, and one would have thought no comparison necessary had the difference been merely one of kind. The comparison must be made between the lowest type of savage man and the highest type of intelligent animal—between the savage, whose ideas are limited, whose language is unknown, whose moral faculties approve a meal of hot missionary, whose abstract reasoning contrives to calculate his four fingers and thumb, and the dog who rescues his master's child, or pines and sickens when his master dies. This subject is so closely linked with others which powerfully affect men's minds that it is difficult to approach it wholly free from prejudice. Many hold as a matter beyond dispute that the vital principle of animals is annihilated at death, and to admit reason in the brute seems to doom all existence to a like end. Again, the question affects and is affected by the doctrine of evolution, and how is it possible for those who think this doctrine sweeps God from the universe and kills all hope of a future life to judge the matter upon its bare merits? How few too possess that sympathy with animals which is necessary to read and understand the mute signs which express their feeling and thought!—*T. H. Powell.*

Instinct or Reason.—It is not yet that the question whether instinct and reason differ in kind or in degree will be settled. C. B., in the September number of Science-Gossip says very rightly that the words instinct and reason should be defined before we can discuss the matter justly. But here we are met on the threshold by lions in the path, for if we could agree on the true definitions of the terms there would almost be an end of the whole matter. Dr. Keegan's definition of instinct as a blind adaptation of means to ends, and reason as a conscious adaptation of means to ends, is as good as many, though far from accurately marking the distinction which some endeavour to prove. Such a definition of instinct would mark no line between the animal and vegetable world, for in the latter means are adapted to ends in a thousand varying contrivances. For the old view of instinct perhaps Paley's definition is as good as any. "An instinct is a propensity prior to experience and independent of instruction." And Julius Cæsar Scaliger, in his mordacious criticism on poor Cardan calls instinct "impetus sine electione," and says, "Bruta non dicuntur velle, sed instigari: unde instinctus dicitur a natura: sicut a Diis afflatio apud M. Tullium." (Exercitatio cccvii.) These old-world definitions are certainly not in accordance with facts, if we admit that—as quoted from Mr. Darwin in my letter in July Science-Gossip—"Animals may constantly be seen to pause, deliberate, and resolve," until this can be disproved I think it may safely and surely be said that instinct and reason are degrees in development of one faculty, and shade off imperceptibly the one into the other. I should not say that, "thin partitions do their bounds divide," but rather that any chart which includes one must perforce include the other. To what purpose is it that Dr. Keegan tells of mistakes made by beavers? If the blind impulse of the castor drives him into an occasional error, may we not share with him the

fallibility which centuries of vaunted reasoning have not expelled from our prouder race? The very fact that animals make mistakes sometimes shows how needful it is that their impulse or instinct should be guided by intelligence or reason, by the experience of life, the instruction and example of their elders, and, perhaps, "inherited memory." Day by day we are laughing at the frailties, the errors, the weaknesses of others, and, let us hope, at our own; shall we then exult that a beaver misplaces his dam? The association of ideas, on which so much stress is laid by C. B., is the starting-point of our reasoning processes, but up and down the animal world we find the relation to that starting-point very various, some animals, including some men, having come short of it, while many animals have passed beyond, or, as most leading naturalists would maintain, the highest efforts of the brutes have done so. It is interesting to note that in Webster's Dictionary the word instinct is explained as, "the natural unreasoning impulse in an animal, by which it is guided to the performance of any action without thought of improvement in the method,"—while reason is said to be "the faculty or capacity of the human mind by which it is distinguished from the inferior animals." It is needless, after the numerous instances and the wide range of facts on record, to insist that animals perform many actions which cannot be attributed to an unreasoning impulse. No one can touch these questions without using the great name of Darwin, and it did occur to me that in quoting his statement, that "only a few persons now dispute that animals possess some power of reasoning," that opinion would have some weight. It was therefore with a comical feeling of injured innocence that I find Mr. H. D. Barclay stating that "The Darwinian hypothesis is not only unsupported by facts, but it is in flagrant contradiction to them"—and to support this marvellous *ipse dixit* adducing one or two well-worn objections, the value of which is well known. It is to be hoped that Mr. Barclay does not wish to emulate the Edinburgh reviewer who came forth to crush the fallacies of evolution, and who has met with such condign punishment in the "Fortnightly Review" of October. We are told that, as far as can be judged, brutes possess no power, of abstract thought, imagination, introspection, nor any moral sense: but will any one who owns an intelligent dog, or who has read the recent correspondence in "Nature," to say nothing of any elementary work of Natural History, admit this? The passage concerning the spider in my note in the July number of SCIENCE-GOSSIP was, as there stated, quoted from Professor Max Müller, who himself drew the illustration from Flourens' "De la Raison;" my contention would be that the spider when he finds his web broken considers whether he shall repair it, or start afresh—and that he exercises judgment and reflection in coming to a decision. To whatever branch of natural science we turn we find nearly all the leading men evolutionists: as Sir John Lubbock has said, "the doctrine of evolution, in some form or other, is accepted by most, if not by all, the greatest naturalists of Europe." And Dr. Allen Thomson, who has followed the secret of life unto its inmost recesses, said in his presidential address to the British Association in 1877: "I consider it impossible for any one to be a faithful student of embryology, in the present state of science, without at the same time becoming an evolutionist." I am far from saying, any more than Mr. Darwin himself, that the whole theory of evolution is complete and finally established; it is enough to know that the most competent students have facts and to spare in support of that theory. But I arrest myself in so ludicrous an endeavour as that of supporting the doctrine of evolution. One point more. Mr. Gilliard suggests that "the power of arranging facts, drawing deductions from them, and acting from those deductions, uninfluenced by the impelling force of instinct," result from reason, and that this kind of reason is only possible in man. Without stopping to criticise the terminology, and admitting that the suggestion has a limited application, is it not obvious that in the millenniums during which the human race has educated itself, mainly through the power of speech, its advance beyond the brute world is not to be wondered at? Among all the causes of melancholy, Aeriall Divels, Fiery Divels, Love, or any other in the black list of Burton's Anatomie, perhaps the one most calculated to depress a philosophic thinker is the slow progress of the human race to the goal of perfection prophesied for it by Mr. Herbert Spencer and other hopeful spirits. —*James Hooper, Denmark Hill, S.E.*

INSTINCT AND INTELLIGENCE IN ANIMALS.—All evidence seems to indicate that instinct and intelligence are not two distinct forms or modes of mentality, but a lower and higher development of one and the same form or mode. Many instances have been given in the pages of this journal and elsewhere of instinct which has, under peculiar circumstances, diverged into intelligent reasoning, and it is well known that many of man's thoughts and actions, which at some time or other have needed the exercise of distinct and appreciable mental energy, tend by continuance and habit to develope into illustrations of unconscious cerebration; and this phase of intellectual activity appears to be in many respects the counterpart of instinct in the lower animals. A man who desires to reach a certain spot, commences to walk thereto, but does not consider the disposition of the members necessary for this action, although, in the early period of his life, it cost him considerable trouble and practice to acquire this muscular harmony, of which now he takes no heed. So on the part of birds building their nests, or migrating by reason of instinct, or untaught ability, or, better still, hereditary, as distinct from acquired ability, have a motive. They feel a want, and unconsciously know how to supply it, performing all that is necessary without a consciousness or consideration of their actions. Further, there must of necessity exist certain primordial structures of an instinctive or intuitive kind, upon which all that a man is as a rational or intelligent being must be built. The difference between these primordial structures and the instinct of the lower animals appears to be that the former is capable of great development, while the latter, from the circumstances of the animal, needs no higher development, and therefore receives none. The calf, directly it is dropped, uses its legs and walks, and never finds any other use for them. The child is some time after birth before it exercises its similar germ of volition, and masters the art of walking, but subsequently it carries this to a much higher development, and learns to use its legs in a variety of ways, saltatory, gymnastic, and otherwise. Yet, though the one walks instinctively, and the other by intelligent effort, they have a similar volitional germ, and when the human being comes in time to walk, all unconscious of his effort, "*nescio quod meditans nugarum, et totus in illis*," there does not appear to be much difference between. This view would indicate that instinct and intelligence are identical in form, though not in degree; and that animals being allowed to possess instinct, may, without any strain of the recognised facts of mental science, be also allowed the possession of intelligence. —*F. H. Habben, B.A.*

INTELLIGENCE IN ANIMALS.—A friend of mine has a dog which is accustomed to run about loose. One day my friend wished to drive out, and did not wish to take the dog, and said so when the dog was by her. She then ordered it to be tied up. Soon after the dog disappeared, and when she was going to start, was nowhere to be found. My friend then started, but had not driven far before the dog appeared from the side of the road, and followed the carriage to the town. It then went away, not following the carriage to the stables, where it was left; but when my friend was walking about the town, the dog came to her and followed her till she returned. My friend has also a terrier which is accustomed to roam about, it is fond of going out through a gate at the end of the garden. This gate always makes a rattling noise when the dog gets through. But when this dog has been doing anything which it has been forbidden to do, instead of coming through the gate and to the front door, the dog creeps through some bushes and goes to the kitchen window. This dog is so fond of fruit that it pulls down the branches of the raspberries and eats of the fruit.—*M. Fordham.*

ANECDOTE OF A PARROT.—Mr. R. Bowdler Sharpe in his description of the parrots, gives a capital anecdote of one of these birds, which may be interesting to those readers of SCIENCE-GOSSIP who are not acquainted with it. Mr. Sharpe says, just as the monkeys have been placed at the head of the Mammalia, on account of their high development, so the parrots from their general cleverness, and especially on account of the facility with which they can talk, have been considered the highest order of birds, and placed at the beginning of the class. It is impossible for some people to avoid the conclusion that these birds think and reason, and the *à propos* or sometimes *mal à propos* way in which they introduce speeches, coupled with the look of wisdom which they assume while being spoken to, seems to show that the brain is being employed in thinking. A friend in Manchester told the writer of a parrot-show in the north of England, where the talking powers of each bird were made the subject of a prize competition. Several of the birds had exhibited their powers, and at last the cover was removed from the cage of a grey parrot, who at once exclaimed on seeing the company to which he was suddenly introduced, "By jove! what a lot of parrots!" an observation which gained him the prize at once. Instances of famous talking birds might be multiplied by the hundred, leaving no doubt on some minds that these birds often possess the power of reason of a very high order. Perhaps I may be allowed to record my opinion in reference to the discussion now going on in SCIENCE-GOSSIP on the intelligence of man and animals (certainly not an appropriate heading since both are animals), that there is no animal in existence, or that ever did exist, which is not endowed with reason either less or more just in accordance with the development of its brain.—*Dipton Burn.*

MICROSCOPICAL ANALYSIS.—Will any of your readers kindly inform me how to proceed in making a microscopical examination for analysis of compound cakes made from materials such as South African ground nuts, palm nut kernels, cocoa nuts, and the meals of same, in order to test their constituent qualities? Or, is there any treatise on the subject published which you can recommend me to refer to in carrying out such examination?—*Lynx.*

GORDIUS AQUATICUS.—An intelligent neighbour who often consults me on doubtful points of natural history writes me thus the folk-lore about it. "It is popularly supposed that a hair of an entire horse falling into a pool of water becomes an eel. As you are conversant with these and kindred subjects, will you kindly say whether you recognise the statements to be in accordance with the teachings of science." Of course my reply was that the animal in question was never a horse-hair, and never could become an eel. I recognise this animal as my old acquaintance, *Gordius aquaticus*, which I used to see at Tallandsand, near Polperro, in a pool where the farm horses were accustomed to water: a brownish, rigid worm like a piece of vivified copper wire. The notion there also, was that it was originally a horse-hair dropped from the mane or tail of the horse while drinking, and becoming subsequently animated. These worms are occasionally found in herbage and puddles. I had heard it said that they inhabited the intestines of some insects, especially the grasshopper. Dr. Spencer Cobbold, our first authority on helminthology, kindly informs me that the Gordii become parasitic in insects, caterpillars, and infest fishes in their young state; also that the young of *G. aquaticus* are found in water beetles.—*T. Q. Couch, Bodmin.*

UNRIPENED FIGS.—The Rev. Z. J. Edwards has in his garden a fig-tree which bears fruit every year. When the figs are full grown they turn yellow, deluding us with the prospect of plenty of ripe figs, and drop off: at this moment the ground is covered with them. Can any of your readers help us as to the cause and tell us of a remedy? The tree is planted in a corner with a high wall on the south and east. But it is luxuriant in growth and looks healthy, the upper branches which are above the wall are in sunshine. The tree is about twenty years old.—*Misterton Vicarage, Crewkerne.*

ENTOMOLOGICAL NOTES FOR 1879.—The following notes, chiefly concerning common insects, may not prove uninteresting to some of your readers. In this district, during the past year, the small tortoiseshell butterfly (*V. urticæ*) has been exceptionally numerous, a fact which has been mentioned to me, not only by those observant of natural objects, but by some who were quite ignorant of such things. The green-veined white has also been very abundant, and the small cabbage and large cabbage whites have been quite up to the average. The orange tip (*A. cardamines*) was very plentiful; indeed, I never saw it so abundant, and in such good condition before. From some unaccountable reason, the peacock (*V. Io*) appears to be disappearing altogether. Last year I only saw three or four specimens, and this year I have only heard of one being observed. One specimen only of the red admiral (*V. atalanta*) has come under my notice. The blues and the common copper have also been less frequent. Four specimens of the painted lady (*V. cardui*) have been observed; a rather unusual occurrence in this neighbourhood. None of them were captured. I have in my possession some specimens of this insect which were caught by my brother at some distance from the coast, in the English Channel. The common wasp has been very scarce, and the fishermen complain very much of the lack of grub. The common housefly, and, indeed, all insect torments of the kind, have been much fewer than in late years.—*J. A. Weldon, Northallerton.*

SAGACITY OF THE MAGPIE.—Those who have never watched the magpie as a pet, would scarce give credence to the following. A portion of a copse had been cut, and some faggots stacked on the ground, under which, near the corner, a hen pheasant was sitting on her eggs; nothing is so sweet to a

magpie's tooth as an egg, but the pheasant had a strong beak and knew how to use it. But a pair of magpies who had a nest in the same copse were equal to the occasion. Mag No. 1 quickly took a position as near as possible to the nest, but just round the corner of the faggot stack, Mag No. 2 alighted in front and in full view of the pheasant, towards which he made noisy advances with distended wings and ruffled feathers backwards and forwards in mimic charges, until the exasperated bird left her nest to drive off the marauder, when in dashed Mag No. 1 and carried off an egg which they both retired to enjoy, returning again in the same manner for a second and a third, but a young pheasant being considered of more value than a young magpie, one was shot, and the other being unable single-handed to cope with the pheasant she brought off the remainder of her brood.—*G. T.*

Postage of Plants, &c., to Foreign Countries.—Having occasion to send some specimens of dried mosses and ferns abroad, and thinking I could forward the same per book-post, I was much surprised on inquiry at our post office to find that the only way of transmiting them was per letter post. I wrote to the Postmaster General in London, stating the nature of the plants in question, asking if I could not send them by some cheaper plan. His reply was "Your inquiry is under consideration." After the lapse of nearly three weeks I am pleased to say I have received a further communication from him in which he says, "Specimens of dried plants and mosses may be sent by *sample* post to places abroad." —*Ben B. Scott.*

Local distribution of Land Shells.—While staying a short time this year at Ilfracombe, Devon, I was considerably impressed by what appeared to me a rather remarkable instance of local distribution of *Helix nemoralis* and its variety *H. hortensis.* On the western cliffs and about the Tors walks *Helix nemoralis* occurred in great abundance, although I failed to find one single specimen of *H. hortensis.* But, on the eastern side of the town, upon Hillsborough and the immediate neighbourhood, Hortensis was in the ascendancy, and, although I did find one or two Nemoralis, they appeared to be the exception and not the rule. As far as I could see the physical conditions of the two districts were the same. Perhaps this or similar instances have been noticed by others.—*John L. Hawkins, jun., Reading.*

Morbid Sensations.—Some time ago I went to see the snakes fed at the Zoological Gardens, a very interesting sight, which no lover of nature should miss. I do not, however, write to describe a scene the reader may witness for himself, but to remark on the strange behaviour of many of the spectators. "How horrid!" "How cruel!" "Come away!" "Don't look!" were the exclamations I heard around me, and many persons left the house. Apart from the inconsequence of the remarks of many of the spectators, it struck me forcibly as passing strange that men and women could not bear to witness the normal workings of nature, without a display of that morbid sensitiveness (so distinct from genuine feeling) which seems so prevalent in these days. It is a curious fact that persons afflicted with this moral malady are far from being the most humane in their conduct to their fellow-creatures and the brute creation.—*A Common Man.*

Yew Poisoning.—I know of two Irish yews in a paddock close to a farm-house in my parish where horses, cows, calves and sheep are placed. The trees are cropped as far as they could reach, and the farmer told me he never lost an animal. I doubt the alleged cases, as why should they not be poisoned in this particular instance?—*S. A. B., Allan, co. Tyrone.*

Fleas on Moles.—Last June I had several freshly killed moles brought me, as I wanted their fleas. I put them in a bowl of cold water and waited for the fleas and acari to rise to the surface. I soon saw something large for a flea crawling on one of the moles, and at once secured it in a bottle. I mounted it with very little pressure; it certainly is a mole's flea but very dark, and it measures from the forehead to the end of the body quite $\frac{9}{40}$ inch, very nearly $\frac{1}{4}$. I have shown it to several microscopists and others, and no one I have met has ever seen a flea nearly so large. I have several fleas of a good size, but the largest measures by a micrometer only $\frac{1}{8}$ inch. The difference between $\frac{9}{40}$ and $\frac{5}{40}$ is no trifle. I should be glad to know whether fleas so much above the usual size are known.—*W. Locock, Clifton.*

Parasites on Hedgehogs.—In reply to your correspondent Singer Barclay, I should say few animals are more infested with parasites than hedgehogs; a flea, two species of ticks, and an acarus being found on them. The flea infests the whole body and may be seen running amongst the spines. The acarus only infests the under and hairy parts, while the ticks, often in company, may be found sticking to the hind legs and round the tail of an aged specimen, and are with difficulty removed without the loss of either head or lancets; it is rather rare to find both fleas and ticks on the same animal, and equally so to find one without any, so that I should infer that they were unable to clear themselves. I have never seen a hedgehog voluntarily take to the water, but it is instant death to immerse a tick.—*George Turvill.*

Bees *v.* Kalmia latifolia.—The following are some observations on the effects of the flowers of kalmia on bees: July 12th. During a brief paroxysm of sunshine, the kalmia was visited by (1) a blue-bottle fly; (2) a butterfly who retreated after a short flirtation; (3) a bee, who remained some time at work, and then crawling about languidly fell down to the ground. July 15th: (1) a bee who set to work steadily, but soon appeared to be stupefied and powerless, I removed her (him) to a pink, where she (or he) remained quietly a little while and then departed; (2) a bee; (3) a humble bee who after flirting with two or three flowers, departed, without alighting; (4) a bee who settled to work for some time, and became almost helpless, was removed to another flower and no more seen. July 18th: Several bees and a humble visited the kalmia, but without alighting. I put a bee into a flower, and after working there some time, found her making feeble efforts to get away. In gathering the bloom, for the purpose of closer inspection, I lost the bee, and so missed the opportunity. Query: Is there some intoxicating substance in the kalmia?

Without an Order for Admission.—Last year a death's head moth was picked up on a fine old oak staircase, erected at West Hampnett House, by Sir John Chapman, in 1617. This year, early in October, another specimen was taken in an adjoining room. No chloroform being immediately available, the peculiar shrill squeak, characteristic of *Acherontia Atropos*, was repeatedly heard. Within the Union House no special attraction was apparent; but, a few yards distant, half of the large garden

was, as usual, planted with potatoes. The past twelve months were sufficiently gloomy in every respect for a purely agricultural district sown with wide breadths of corn; and visitation by such "casuals" at the commencement of a period of great trial and depression, and again later, though it is to be feared not at the termination of it, might, in Eastern Europe, have been interpreted as an evil omen. Great average longevity of the pauper inmates has not, however, yet been perceptibly decreased by these heralds of the destroying angel. One resident stood for the militia drawing some eighty years since, and well remembers the bells of Alresford and the surrounding village churches being rung, night after night for a week, and then, occasionally, in commemoration of the great victory at the Nile in 1798; he continues hearty and well in spite of *Acherontia Atropos.—M. O.*

History of the Apple-tree.—Having seen myself quoted in a recent article "On the Apple-tree" in your magazine, as "the late Mrs. Bayle-Bernard," allow me to ask you to contradict the statement implied, since I do not wish the world to be told that I have quitted it while it is still in my power to be, yours, &c.—*E. G. Bayle-Bernard, Author of "Our Common Fruits."*

Harvest Mice reared in Captivity.—A month ago, a mouse of this species was brought to me, which I considered would shortly become a mother. Knowing full well that to turn her into the large cage with my other harvest mice would mean death to her progeny, she was placed in a cage by herself, with a good nest of dry grass and straw. The same night she gave birth to some young ones—how many was not discovered till they emerged into public life. The next morning (waiting, of course, till the mother was out of the nest in the playground), I parted the straw—already gnawed into shreds and woven into a covering—with a new pen, as being an implement not likely to have any smell about it that might rouse her anger, in order to ascertain whether, in consequence of her recent captivity and solicitude for her offspring, she had become an infanticide. This contingency was the more probable, because she had been roughly handled by the boy who caught her. However, there were some pink specks down at the bottom of the nest, moving slightly. Then I at once shaded the cage entirely with a cloth, which was only removed for a few moments, once every day, when a fresh supply of food, consisting of bread and butter, meat, flies, wheat, &c., and clean water, was placed in the playground—on which occasions I took a hasty peep at the nest to see that all was going on well. When thirteen days old, the young mice, three in number, and about the size of a cockchafer, first popped their heads out of the nest, anxious to test the strength of their incisors on anything they could find to nibble at, and exercise their delicate prehensile tails. They were then of a dull brown above, and dusky white beneath; and though now three parts grown, have not yet assumed the red colour peculiar to the upper parts of adult harvest mice, the stomach and thighs of which are pure white. It is worthy of record that through all their thirteen days of babyhood, the youngsters, though close at hand in my study, were not once heard to squeak. This is the first time with which I am acquainted, that the young of the harvest mouse—the smallest mammal in England, and probably in the world—have been reared in captivity.—*A. H. Malan, M.A., Perran-Arworthal.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

To Anonymous Querists.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

To Dealers and others.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

W. G. Daish.—The object you enclosed is a fungus called *Clavaria fusiformis*.

A. J. Chamberlin.—The objects on the leaves are commonly called "oak-spangles." They are galls, formed by a species of Cynips. For an account of them, see Taylor's "Half-hours in the Green Lanes," page 197.

W. J. Colebrook.—It is not very common to find lilac leaves growing in malformed pairs like those you sent us, and we are much obliged to you for them. You can join the Quekett Club without living in London. Write to the secretary for rules, &c., enclosing stamped and addressed envelope for reply.

J. A. Bather.—The following are excellent works on blow-pipe analysis of minerals:—"Determination of Minerals by the Blowpipe," by Dr. C. W. C. Fuchs (translated by T. W. Danby, F.G.S.), price 5*s*., London: Field & Tuer, 50 Leadenhall Street; and "Blowpipe Analysis," by J. Landauer, price 4*s*. 6*d*., London: Macmillan.

O. P. Cambridge.—The pretty diminutive red fungus is *Physarum rubiginosum*.

G. T. Harris.—There are some scholarships in botany, we believe, in connection with the London hospitals. We do not think the Science and Art Department can open out to you any office. The "Journal of Botany," price 1*s*. 3*d*., is a monthly serial devoted to botany, published by West, Newman, & Co., 54 Hatton Garden, London.

E. E. Edwards.—The following are good books on British zoology:—Yarrell's "Fishes," Couch's "Fishes," Yarrell's "British Birds," Bell's "British Quadrupeds," Forbes' "British Starfishes," Gwyn Jeffreys' "British Conchology" (5 vols.), Gosse's "Marine Zoology" (2 vols.), Bell's "Stalk-eyed Crustacea." As to the rest, Carpenter's "Animal Physiology," Huxley and Martin's "Physiology," Flower's "Osteology," &c.

Miss E. C. (Woburn).—The specimens sent go by the name of "artichoke galls," on account of their resemblance to those vegetables. They are caused by a species of Cynips piercing the young leaf-buds of the oak, so that they develop abnormally fast, and assume the artichoke shape.

F. Hepburn.—You may get a capital student's microscope for about five pounds, from any of the makers whose advertisements appear in our columns, and all of whom we can equally recommend for good workmanship and reasonable prices.

A. Davidson.—Smith's "Ferns, British and Foreign" (fourth edition), is published at 7*s*. 6*d*., London: David Bogue.

R. Oakeshott.—Newman's "Insects," Wood's "Insects at Home," Rye's "British Beetles," are all good elementary books. We hope to publish the article you mention before long.

J. A. C. (Rugby).—See an answer to your question about damping pupæ, &c., in a note by Mr. Henry Miller, entitled "Keeping Pupæ," which appeared in Science-Gossip, vol. viii. page 261.

W. H. Warner.—Your bat is the pipistrelle, or "flitter-mouse" (*Vespertilio pipistrellus*).

EXCHANGES.

Wanted, fossils, for marine shells, from north-east coast of Australia. Exchange in nine months if offer is accepted.—George Martin, Market Street, Gainsborough, Lincolnshire.

Eggs of sparrow-hawk, landrail, moorhen, coot, common snipe, common sandpiper, and mountain linnet for exchange. Eggs of English birds preferred. Apply to W. M. L. Brown, The Orchard, Carluke, N.B.

Young of swan-mussel, foraminifera, &c., in exchange for other well-mounted objects, or good material.—William Low Sarjeant, 6 Dagnall Park Terrace, Selhurst, S.E.

Mosses.—A few duplicates of Ceylon mosses (correctly named), to exchange for rare British mosses.—T. W. N. Beckett, Tan-y-Gop, Llanddulas, Abergele.

Carpenter on the Microscope, third edition, offered for the "Leisure Hour," for either of the years 1865, 1866, or 1867. The latter to be in monthly parts, or in the publishers' cloth boards.—S. A. H., 17 Longton Grove, Sydenham.

Wanted, good works on natural-history subjects, sport, and travel, in exchange for lepidoptera and good eggs, all in first-

class condition.—J. D. W., 60 Portland Road, Newcastle-upon-Tyne.

WANTED (diatoms) *Toxonidea Gregoriana* and *Biddulphia regina*, selected, or gatherings containing same. Rare selected diatoms in exchange. —E. D. Marquand, Hea, Madron, Penzance.

FOR unmounted sections of elder, tamus, nettle, black bryony, dog-rose, lychnis, send unmounted object to J. M., 12 Porchester Street, near Clifford Street, Birmingham.

WELL-MOUNTED slides of *Zygonema cruciata*, *Zygonema quininum*, *Lyngbya floccosa*, and *Chætophora elegans*, offered in exchange for other slides of interest.—R. L. Hawkins, Hillside, Hastings.

VOLUMES of "Zoologist" and "Entomologist," also Sharp's list of Coleoptera, for Guenée's "Pyrales and Deltoides," or Babington's "Manual," and Stainton's "Entomologist's Companion," 1854. Particulars of books sent.—W. Thomas, St. Andrew's Hospital, Northampton.

PICKED diatoms from Peruvian guano and deposits from California, Bermuda, &c., in exchange for June gatherings.—J. Tempère, 269 Moss Lane, Manchester.

ACME *lineata*, *H. lamellata*, *H. aculeata*, for *Paludina vivipara*, var. *unicolor*, or for *Anodonta cygnæa*, large specimens 7 or 8 inches wide, or larger if can be got; no other will do.—T. Whitenham, Cross Lane Marsh, Huddersfield.

WANTED, microscope or magic lantern; will give in exchange collections of eggs, land and fresh-water shells, and fossils from silurian, carboniferous, oolite, and chalk strata; particulars given.—James Ingleby, Eavestone, near Ripon.

LAND and fresh-water shells in exchange for books on botany, geology, and conchology.—C. T. Musson, 68 Goldsmith Street, Nottingham.

NEATLY finished entomological slides (balsam mounts), in exchange for any good slides; diatoms preferred.—G. P. Nevill, 2 James Street, Lozell's Road, Birmingham.

WANTED, carboniferous crinoids, especially heads. Offered, carboniferous fossils, viz. mollusca, fish-remains, &c.—T. Stock, 16 Colville Place, Edinburgh.

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"Bulletin of the U. S. Geological Survey," vol. v. No. 1.

"Les Mondes."

"Le Monde de la Science et de l'Industrie," No. 10.

"Extinct Species of Rhinoceridæ of North America," &c. By E. D. Cope.

"Notes on the Flora of Surrey." By A. Bennett.

"Journal of Forestry," October.

"Feuille des Jeunes Naturalistes," November.

"Annual Report of the West London Scientific Association."

"Transactions of the Watford Natural History Society."

"Proceedings of the Norwich Geological Society."

"Lectures on the Geology of Leighton Buzzard and its Neighbourhood." By E. W. Lewis, F.R.G.S.

"Proceedings of the Liverpool Geological Society."

"The Insect Fauna of the Mezozoic Period," No. 2. By H. Goss, F.L.S.

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"Ben Brierley's Journal."

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